Field and Woodland Plants



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William S. Furneaux

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Plate I.

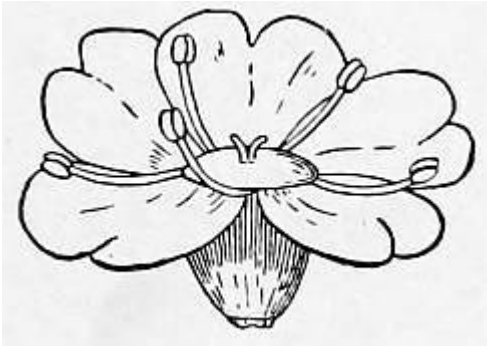
SPRING FLOWERS OF THE '

1. Green Hellebore.
2. Plantain-leaved Leopard's-bane.
3. Lady's Slipper.
4. Sand Garlic.
5. Wild Hyacinth.
6. Wood Melic Grass.

FIELD
AND
WOODLAND PLANTS

BY
W. S. FURNEAUX

AUTHOR OF
'THE OUTDOOR WORLD' 'BRITISH BUTTERFLIES AND MOTHS'
'LIFE IN PONDS AND STREAMS' 'THE SEA SHORE' ETC.



WITH EIGHT PLATES IN COLOUR, AND NUMEROUS
ILLUSTRATIONS BY PATTEN WILSON, AND PHOTOGRAPHS
FROM NATURE BY THE AUTHOR

LONGMANS, GREEN, AND CO.
39 PATERNOSTER ROW, LONDON
NEW YORK, BOMBAY, AND CALCUTTA
1909

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PREFACE

This additional volume to the young naturalist's 'Outdoor World Series' is an attempt to provide a

guide to the study of our wild plants, shrubs and trees—a guide which, though comparatively free from technical terms and expressions, shall yet be strictly correct and scientific.

The leading feature of the book is the arrangement of the plants and trees according to their seasons, habitats and habits; an arrangement which will undoubtedly be of the greatest assistance to the lover of wild flowers during his work in the field, and also while examining and identifying his gathered specimens at home.

A large portion of the space has necessarily been allotted to the descriptions of plants, several hundreds of which have been included, and a large proportion of these illustrated; but not a little has been devoted to an attempt to create an interest in some of those wonderful habits which lead us to look upon plants as living beings with attractions even more engrossing than their beautiful forms and colours.

It has been thought advisable to give but little attention to aquatic plants and to the flowers which are to be found only on the coast, these having been previously included in former volumes of this series dealing, respectively, with pond life and the sea shore.

The thanks of the author are due to his friend, G. Du Heaume, Esq., for his valuable assistance in collecting many of the flowers required for description and illustration.

W. S. F.

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FIELD

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I

INTRODUCTION

GENERAL CHARACTERS OF PLANTS AND THE IDENTIFICATION OF FLOWERS

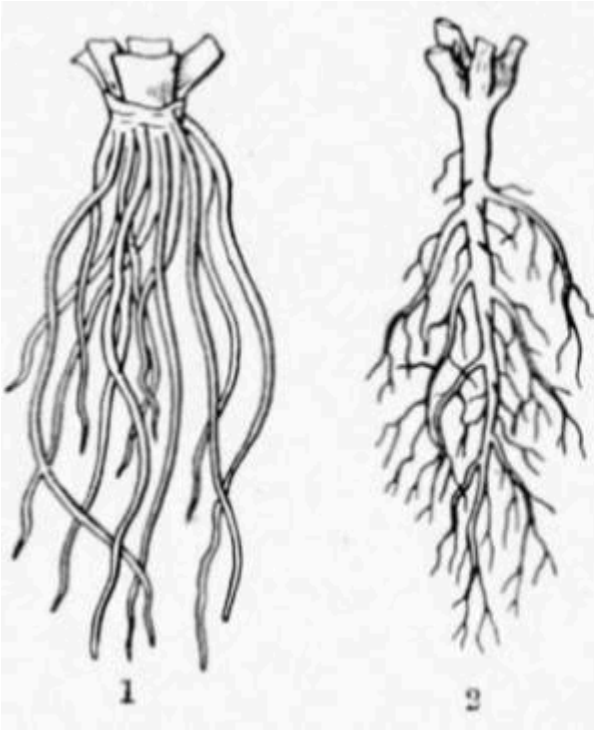
The beginner will often find it difficult, and sometimes quite impossible, to identify some of the flowers seen or gathered during a country ramble; and he will hardly be surprised to experience many disappointments in his attempts to do this when he realises the large number of species among our flowering plants, and the very close resemblance that allied species frequently bear to one another. But there are right and wrong methods of setting to work for the purpose of determining the identity of a plant, and the object of this chapter is to put the beginner on the right track. He must remember, however, that the aid given here is intended to assist him principally in the identification of the commoner species, though it may, at the same time, help him to determine the natural affinities or relationships of other flowers that fall in his way.

The directions we are about to give the reader regarding this portion of his work will be understood

by him only if he is fairly well acquainted with the general characters of a flowering plant and with the structure of flowers; and as it would hardly be advisable to assume such knowledge, we shall give a brief outline of this part of the subject, dealing only with those points that are essential to our purpose, and explaining the meaning of those terms which are commonly employed in the description of plants and their flowers.

The Root

The root is that portion of the plant which descends into the soil for the absorption of the mineral food required. It really serves a double purpose, for, in addition to the function just mentioned, it fixes the plant in its place, thus forming a basis of support for the stem and its appendages.



FORMS OF
1. Simple fibrous. 2. Branched fibro

Roots are capable of absorbing liquids only, and all fertile soils contain more or less soluble mineral matter which is dissolved by the moisture present. This matter is absorbed mainly by the minute root-hairs—outgrowths of the superficial cells—which are to be found on the rootlets or small branches that are given off from the main descending axis.

The principal forms of roots occurring in our flowering plants are:—

1. The *simple fibrous root*, consisting of unbranched fibres such as we see in the Bulbous Buttercup and the Common Daisy.

2. The *branched fibrous root*, as that of the Chickweed and Grasses.

3. The *tap root*, which is thick above and tapers downwards, like the roots of the Dandelion, Carrot and Wild Parsnip.

4. The *tuberous root*, common among the Orchids.

5. The *creeping root*, possessed by some Grasses in addition to their fibrous roots.

Besides these common forms there are roots of a somewhat exceptional character, such as the *aerial roots* or *suckers* which grow from the stem of the Ivy and serve to support the plant; and the roots of the Mistletoe, which, instead of penetrating the soil, force their way into the substance of certain trees, from which they derive the necessary nourishment.

The student of plant life must always be careful to distinguish between roots and underground stems, for there are many examples of creeping and tuberous stems which resemble certain roots in general appearance. A true root bears no buds, and, therefore, is not capable of producing new plants. If a root creeps under the ground, as does the root of the Barley Grass, it merely serves the purpose of collecting nourishment from a wider area—a matter of considerable importance when the soil is dry and deficient in suitable mineral food. A creeping stem, on the other hand, developes buds as it proceeds, each bud giving rise to a new plant; and the creeping itself is the result of the growth of a permanent terminal bud.

Again, when studying plants for the purpose of identification, it is often important to note whether the root is *annual*, *biennial*, or *perennial*; that is,

whether the root lives for one season only, lives throughout the winter, and supports the plant for a second season, or retains its life for an indefinite number of years.

Most of the roots that live over one season are of a fleshy nature, thick and tapering, or tuberous, and contain more or less stored nourishment which assists the new growths that are called forth by the warmth and light of the early spring sun.

The Stem

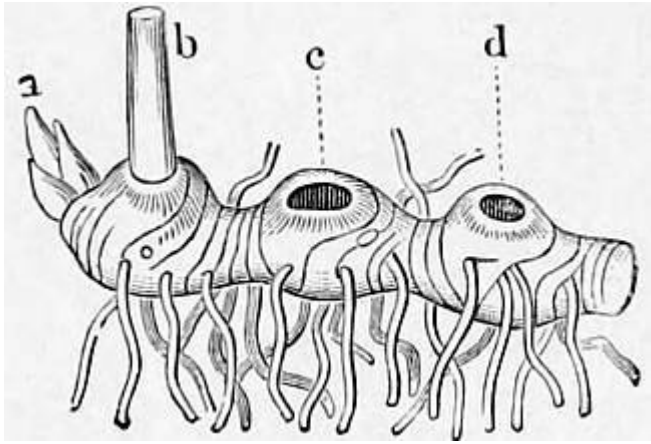
The stems of plants exhibit a much greater variety of structure and habit than do the roots. Their chief functions are to support the leaves and flowers, and to arrange these parts in such a manner that they obtain the maximum of light and air; also to form a means of communication by which the sap may pass in either direction. Stems also frequently help to protect the plant, either by the development of thorns or prickles, or by producing hairs which prevent snails and slugs from reaching and devouring the leaves and flowers.

The character of the stem is often of some importance in determining the species, so we must now note the principal features that should receive our attention.

As regards surface, the stem may be *smooth* or *hairy*. In general form, as seen in transverse section, it may be *round*, *flattened*, *triangular*, *square*, or traversed longitudinally by ridges and furrows more or less distinct. Flattened stems are sometimes more or less *winged* with leaf-like extensions, as in the Everlasting Pea, in which case the wings perform the functions of foliage leaves. It should also be noted whether the

stems are *herbaceous*, or *woody*, and whether they are *hollow*, or *jointed*.

In some plants the stem is so short that the leaves appear to start direct from the root, as in the Dandelion and Primrose. Such stems are said to be *inconspicuous*.



RUNNING UNDERGROUND STEM OF SOLOMON'S SEAL
a, Terminal bud from which the next year's stem is developed; b, Stem present year; c, and d, Scars of the stems of previous years.

The longer and conspicuous stems are either *simple* or *branched*, and they may be *erect*, *prostrate*, *trailing*, *climbing*, or *running*. In the case of climbing stems it should be noted whether the necessary support is obtained by means of tendrils, rootlets, or suckers, or by the twining of the stem itself.

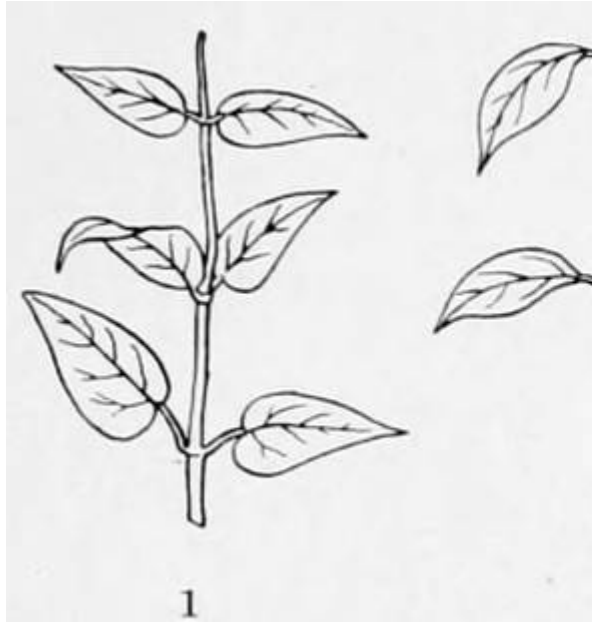
Running stems are those which run along the surface of the ground by the continued growth of a terminal bud, and produce new plants at intervals, as in the case of the Wild Strawberry. Many stems, however, creep under the ground, and these should always be distinguished from running roots, from which they

may be known by the production of buds that develop into new plants, as in the Iris and Solomon's Seal.

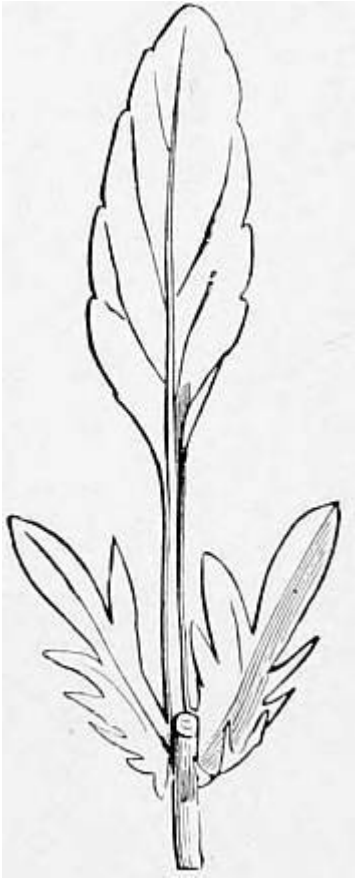
The Leaf

The arrangement of the leaves on the stem is a matter of great importance for purposes of identification. Especially should it be noted whether the leaves are *opposite*, *alternate*, *whorled* (arranged in circles round the stem), or *radical* (apparently starting direct from the root).

Some leaves have smaller leaves or scales at their bases, that is, at the points where they are attached to the stem of the plant. Such leaves or scales are termed *stipules*. They are often so well developed that they are as conspicuous as the ordinary foliage leaves, and in such instances they perform the functions of the latter. The presence and character of the stipules should always be noted. A leaf without stipules is said to be *exstipulate*.



ARRANGEMI
1. Opposite. 2. Al



Leaf of the Pansy with Two Large Stipules.

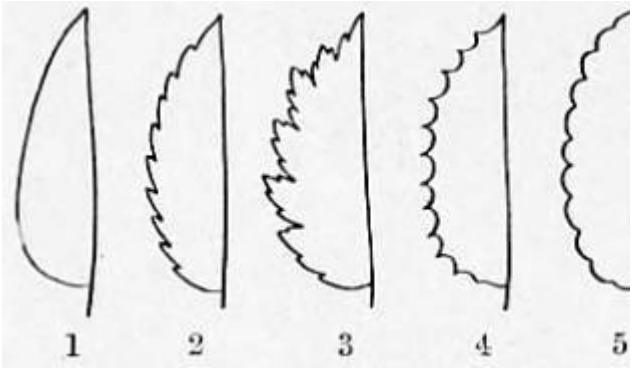
A leaf usually consists of two distinct parts—the *petiole* or stalk, and the *lamina* or blade. Some, however, have no petiole, but the blade is in direct contact with the stem. These leaves are said to be *sessile*, and some of them clasp the stem, or even extend downwards on the stem, forming a wing or a sheath.

A leaf is said to be *simple* when the blade is in one

continuous whole, even though it may be very deeply divided; but when the blade is cut into distinct parts by incisions that extend quite into the midrib (the continuation of the stalk to the tip of the leaf), the leaf is *compound*.

The student must be careful to distinguish between compound leaves and little branches or twigs bearing several simple leaves, for they are often very similar in general appearance. The compound leaf may always be known by the total absence of buds, and often by the presence of one or more stipules at the base of its stalk; while a branch bearing a similar appearance usually has a terminal bud, also buds in the exils of its leaves, and never any stipules at the point where it originates. The distinct parts of compound leaves are termed *leaflets*.

Attention to the form and character of the leaf is often of as much importance as the observation of the flower in the determination of species. Not only should we note the general shape of the leaf, but also the character of its surface, its margin, and its apex. The surface may be *smooth*, *hairy*, *downy*, *velvety*, *shaggy*, *rough*, *wrinkled* or *dotted*. The margin is said to be *entire* when it is not broken by incisions of any kind. If not entire it may be *toothed*, *serrate* (sawlike), *crenate* or *wavy*. Sometimes it happens that the teeth bear still smaller teeth, in which case the margin is said to be *doubly toothed*; or, if the teeth are sawlike, it is *doubly serrate*. As regards the apex, it is generally sufficient to note whether it is *acute* (sharp), *obtuse* (blunt), or *bifid* (divided into two).



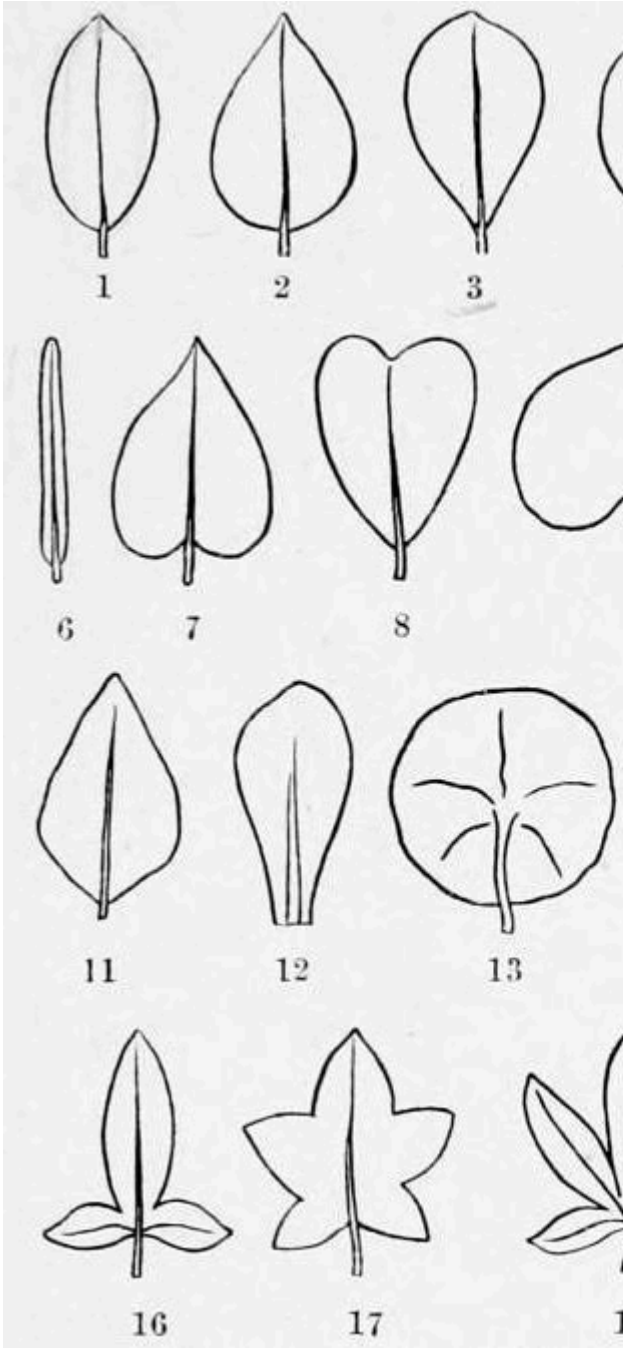
MARGINS OF LEAVES
1. Entire. 2. Serrate or sawlike. 3. Doubly serrate. 4. Dentate or toothed. wavy.

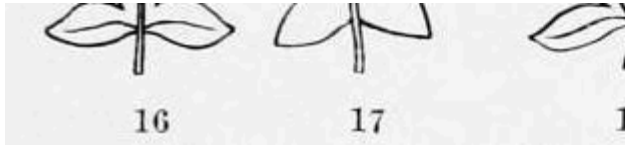
It is not necessary to describe separately all the principal forms of simple and compound leaves. These are illustrated, and the student should either make himself acquainted with the terms applied to the different shapes, or refer, as occasion requires, to the illustrations. Concerning the compound leaves, however, their segments are themselves sometimes divided after the manner of the whole, and even the secondary segments may be similarly cut. Thus, if the segments of a pinnate leaf are themselves pinnately compound, the leaf is said to be *bi-pinnate*; and, if the secondary segments are also compound, it is a *tri-pinnate* leaf.

INFLORESCENCE

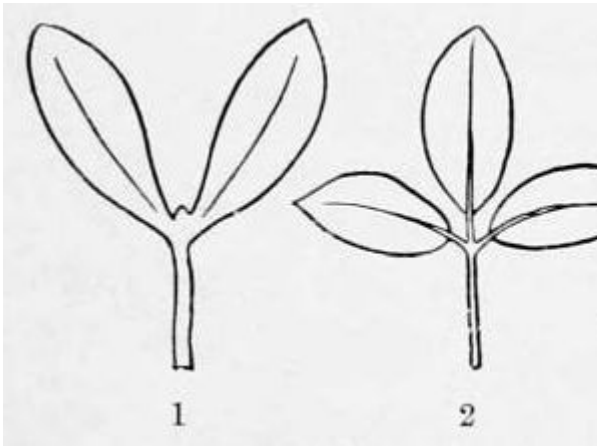
We must now turn our attention to the different kinds of *inflorescence* or arrangement of flowers. Flowers are commonly mounted on stalks (*peduncles*), but in many cases they have no stalks, being attached directly to the stem of the plant, and therefore said to be *sessile*. Whether stalked or

sessile, if they arise from the axils of the leaves—the angles formed by the leafstalks and the stem—they are said to be axillary. When only one flower grows on a stalk it is said to be *solitary*; but in many cases we find a number of flowers on one peduncle, in which instances, should each flower of the cluster have a separate stalk of its own, the main stalk only is called the peduncle, and the lesser stalks bearing the individual flowers are the *pedicels*.

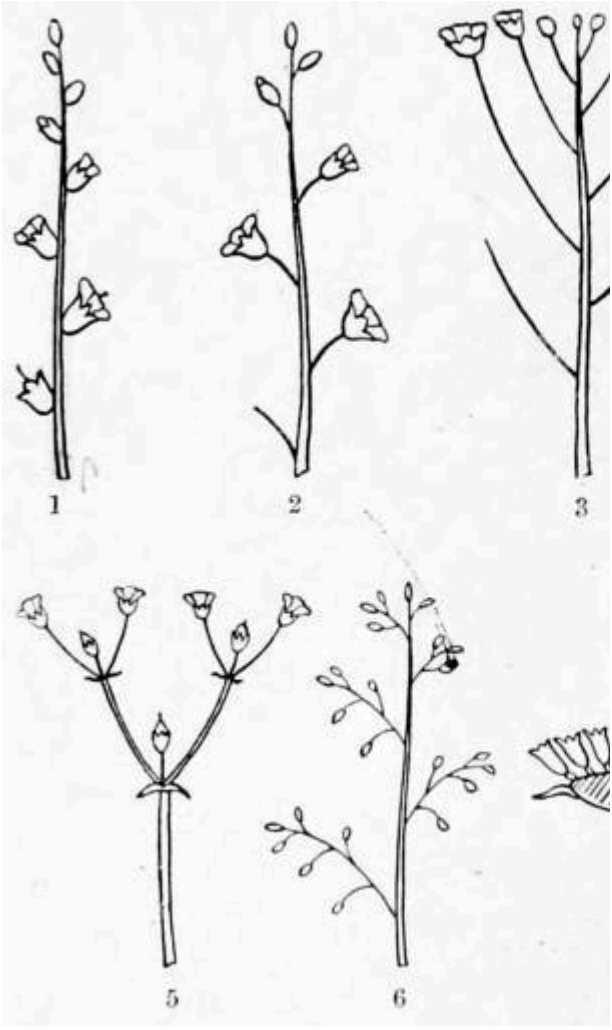

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VARIOUS FORMS OF SIMPLE I
1. Oval or elliptical. 2. Ovate. 3. Obovate. 4. Orbicular. 5. Lanceolate. 6
9. Reniform (kidney-shaped). 10. Sagittate (Arrow-shaped). 11. Rhomb
(stalk fixed to the centre). 14. Oblique. 15. Runcinate (lobes pointing
shaped). 17. Angled. 18. Palmate. 1



FORMS OF COMP
1. Binate. 2. Ternate. 3.



FORMS OF INFLORES
1. Spike. 2. Raceme. 3. Corymb. 4. Umbel. 5. Cyme. 6. Compound Racer

It is often convenient to make use of certain terms to denote the various arrangements of flower-clusters, and the principal of these are as follows:—

1. *Spike.*—Sessile flowers arranged along a common

axis.

2. *Raceme.*—Flowers stalked along a common axis.

3. *Corymb.*—Flowers stalked along a common axis, but the lengths of the pedicels varying in such a manner as to bring all the flowers to the same level.

4. *Umbel.*—The pedicels all start from the same level on the peduncle.

5. *Cyme.*—An arrangement in which the flower directly at the end of the peduncle opens first, followed by those on the branching pedicels.

6. *Panicle.*—A compound raceme—a raceme the pedicels of which are themselves branched.

7. *Capitulum* or *Flower-head*.—A dense cluster of flowers, all attached to a common broad disc or receptacle.

Other forms of inflorescence may also be compound. Thus, a *compound umbel* is produced when the pedicels of an umbel are themselves umbellate.

The Flower

A flower, if complete in all its parts, consists of modified leaves arranged in four distinct whorls, the parts being directly or indirectly attached to a receptacle.

The outer whorl is the *calyx*, and is composed of parts called *sepals*, which may be either united or distinct. The calyx is usually green; but, in some cases, is more or less highly coloured. Sometimes the calyx is quite free from the pistil or central part of the flower, the sides of which are thus left naked, and the calyx is then said to be *inferior*. If, however, it is united to the surface of the pistil it is *superior*.

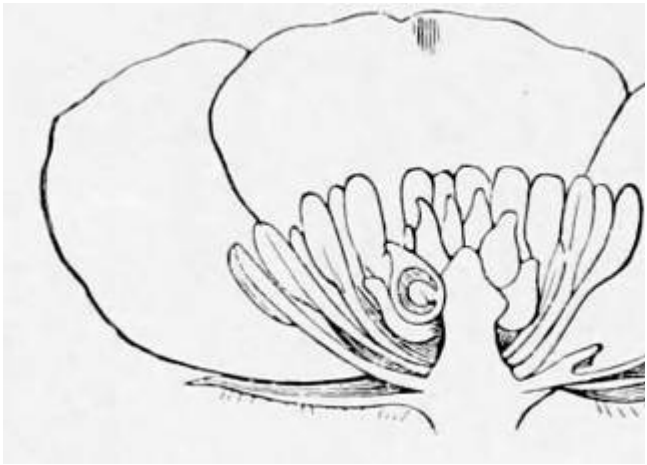
When it remains after other parts of the flower have decayed, it is said to be *persistent*.

The second whorl—the *corolla*—is usually the whorl that gives most beauty to the flower. It is composed of parts, united or distinct, called *petals*.

Both calyx and corolla vary very considerably in shape. They may be cup-shaped, tubular, bell-shaped, spreading, funnel-shaped, lipped, &c. If the sepals and petals are arranged symmetrically round a common centre, the calyx and corolla, respectively, are said to be *regular*; if otherwise, they are *irregular*.

The third whorl consists of the *stamens*, each of which, in its most perfect form, is made up of a *filament* or stalk, and an *anther* which, when mature, splits and sets free the *pollen* that is formed within it. Sometimes the stamen has no filament, and the anther is then said to be sessile.

The mode of attachment of the stamens is very variable. They may grow from immediately below the pistil, or from its summit; or they may be attached to either the petals or the sepals. The filaments are usually distinct, but sometimes they are united in such a manner as to form a tube, or grow into two or more bundles. The anthers are usually distinct, even when the filaments are united; but these sometimes grow together.



LONGITUDINAL SECTION THROUGH THE FLOWER OF T
Showing the calyx, corolla, stamens and pistil. The pistil consists of seve
is represented in section to show its single o

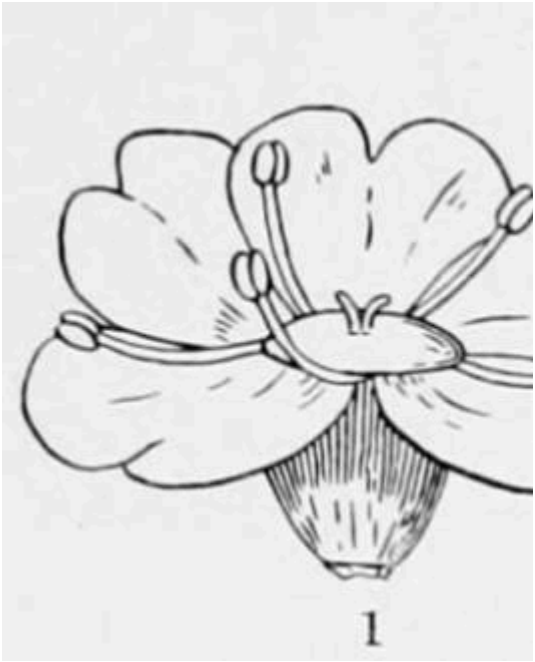
The central part of the flower is the *pistil*, and this is made up of one or more parts called *carpels*. Each carpel, when distinct, is a hollow case or *ovary*, prolonged above into one or more stalks or *styles*, tipped by a viscid secreting surface called the *stigma*. The ovary contains the *ovules*, attached to a surface called the *placenta*; and these ovules, after having been impregnated by the pollen, develop into seeds which are plants in embryo. The ovary may have no style, and the stigma is then sessile.

Where the pistil consists of more than one carpel, these carpels may unite in such a manner as to form a single cell, or an ovary of two or more cells. In other cases the carpels remain quite distinct, thus forming a number of distinct ovaries, each with its own stigma. For purposes of identification it is often necessary to note the position of the placenta. This may be at the side of the ovary, in which case it is said to be *parietal*; or it may stand up in the centre of

the ovary, without any attachment to the sides, when it is described as *free central*. If, however, it occupies the centre of the ovary, but is attached by means of radiating partitions to the sides, it is termed *axile*.

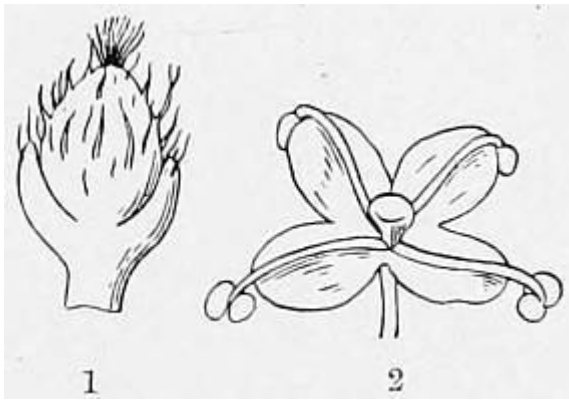
If the ovary is quite free in the centre of the flower, the surrounding parts being attached below it, it is said to be *superior*; but if the perianth (p. 11) adheres to it, it is *inferior*.

A leaf or scale will often be observed at the foot of a flower stalk or at the base of a sessile flower. This is termed a *bract*, and a flower possessing a bract is said to be *bracteate*. The bract is sometimes so large that it almost completely encloses the flower, or even a cluster of flowers.



The flower is the reproductive part of the plant, being concerned in the production of the seeds; but the organs directly connected with the seed-formation are the pistil and the stamens, the former containing the ovules, and the latter producing the pollen cells by means of which the ovules are impregnated. Thus the stamens and the pistil are the *essential* parts of the flower, though the corolla and the calyx may perform some subsidiary function in connexion with the reproduction of the species.

This being the case, a flower may be described as *perfect* if it consists of stamens and pistil only, without any surrounding calyx or corolla; and *imperfect* if it possesses no pistil *or* no stamens, regardless of the presence or absence of calyx and corolla.



UNISEX FLOWERS OF THE NETTLE
1. Pistillate. 2. Staminate.

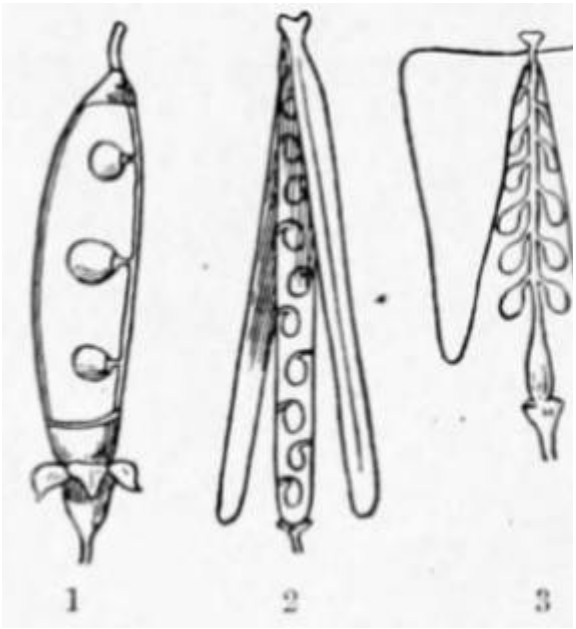
The two outer whorls of a well-developed perfect flower (calyx and corolla) together form the *perianth*. Some flowers, however have only one whorl outside the anthers, representing both the calyx and corolla of the more highly organised flower. This one whorl,

therefore, is the perianth, and its parts are not correctly termed either petals or sepals, since they represent both.

A perfect flower is sometimes spoken of as *bisexual*, for it includes the two sexual organs of the plant—the ovary or female part, producing the ovules; and the stamens or male part, which is concerned in the impregnation or fertilisation of the ovules.

Many plants produce only *unisexual* (and therefore imperfect) flowers, which contain either no stamens or no pistil. If such possess stamens and no pistil, they are called *staminate* or *male* flowers; and if pistil and no stamens, *pistillate* or *female* flowers. These two kinds are sometimes borne on the same plant, when they are said to be *monœcious*; but often on separate plants (*diœcious*), as in some of the Nettleworts and the Willow Tree. Spikes of unisexual flowers, such as are common among our forest trees, are called *catkins*.

The Fruit and Seed



DE
1. Pod. 2. Siliqua. 3. Silicula. 4. Follicles(cluster of three). 5. Capsule sp

After the ovules have been impregnated by the pollen they develop into seeds, each of which consists of or contains an embryo plant; and, at the same time, the ovary itself enlarges, changing its character more or less, till it becomes a ripened *fruit*.

Fruits vary very considerably in their general characters, but may be divided into two main groups —those that split when ripe (*dehiscent fruits*) and those which do not split (*indehiscent fruits*).

The principal forms of dehiscent fruits are:—

1. The *pod* or *legume*, which splits into two valves, with placenta on one side.

2. The *siliqua*, a long, narrow fruit that splits into two valves which separate from a membrane with

placenta on both sides.

3. The *silicula*, of the same nature as the siliqua, but about as broad as it is long.

4. The *follicle*, which splits on one side only, through the placenta.

5. All other fruits that split are termed *capsules*. Some of these split longitudinally, some transversely, and others by forming pores for the escape of the seeds.

The chief kinds of indehiscent fruits are:—

1. The *drupe* or stone-fruit, which consists of a hard stone surrounded by a fleshy covering, as the plum and the cherry.

2. The *berry*, which is soft and fleshy, and contains several seeds, like the currant and the grape.

3. The *nut* or *achene*—a fruit with hard and dry walls, as the filbert and the acorn.

4. The *samara* or winged fruit, like that of the sycamore.

Various modifications of these indehiscent fruits are to be met with; thus, the blackberry is not really a berry, but a cluster of little drupes formed from a single pistil of many carpels. A berry, too, may be made up of many parts, as is the case with the orange. The apple and similar fruits consist of a core (the true fruit) surrounded by a fleshy mass that is produced from the receptacle of the flower; and the strawberry is a succulent, enlarged receptacle of the flower, with a number of little achenes (the true fruits) on its surface.

The seed, as we have already observed, is the embryo plant. It consists of one or more seed-leaves or *cotyledons*, a *radicle* or young root, and a *plumule*

or young bud. In many cases the skin of the seed encloses nothing more than the three parts of the embryo, as named above; but it sometimes contains, in addition, a quantity of nutrient matter in the form of albumen, starch, oil, gum, or other substance.

Classification of Flowering Plants

Our flowering plants are divided into two main groups, the *dicotyledons* and the *monocotyledons*. These terms suggest that the division is based on the nature of the seed, which is really the case, but the groups are characterised by differences in other parts. Thus, the plants which produce seeds with two cotyledons may be known by the nature of the stem, which consists of a central pith, surrounded by wood arranged in one or more rings, and the whole enclosed in an outer epidermis or in a bark. These plants also bear leaves with netted veins, and the parts of the flower are usually in whorls of four or five or multiples of four or five. Those plants whose seeds have only one cotyledon may be known by the absence of a central pith and true bark in the stem, while the wood is arranged in scattered bundles instead of in a ring or rings. They have also, generally, leaves with parallel veins; and the parts of the flower are usually in threes or multiples of three. The following table shows these features at a glance: —

Dicotyledons	*Monocotyledons*
Embryo with two cotyledons.	Embryo with one cotyledon.

Stem with central pith, wood in rings or rings, and bark.	Stem with no central pith, no true bark, and wood not in rings.
Leaves with netted veins.	Leaves with parallel veins.
Parts of flower usually in fours or fives.	Parts of flower arranged in threes or multiples of three.

These two great divisions or *classes* are split up into *sub-classes*, each embracing a large number of plants with common characters; and the sub-classes are again divided into *orders*, and the orders into *genera*.

The student should always endeavour to determine the order to which any flower he finds belongs; and, if possible, the genus and the species. It is certainly a pleasure to be able to call flowers by their names, but at the same time it must be remembered that a vast deal of pleasure may be gained by the study of flowers—their peculiar structure, habits and habitats —even though their names are unknown; and the student who has learnt to recognise these characters, and to discover the relationships that exist between certain flowers of different species, is certainly much more fortunate than the one who knows abundance of names with only a meagre acquaintance with the flowers themselves.

Our table of classification gives the most important distinguishing characters of the classes, sub-classes, and orders, of a very large proportion of our wild flowers, and will enable the reader to determine the natural order of almost every one he sees. In order to

show how this table is to be used we will take an imaginary example.

Let us suppose that we find a plant with a square stem; opposite, simple leaves with netted veins; flowers apparently in whorls, in the axils of the leaves; persistent calyx of five united sepals; a lipped corolla, of five united petals, two forming the lower, and three the upper lip; four stamens, attached to the corolla, two longer than the others; a superior, four-lobed ovary; and a fruit of four little nuts; then we proceed to determine the natural order to which it belongs as follows:—

The netted veins of the leaves, and the arrangement of the parts of the flower in whorls of four and five, show us at once that the plant is a *dicotyledon*. Then, the presence of both calyx and corolla enables us to decide that the plant belongs to Division I. of the dicotyledons—that it belongs to one of the orders 1 to 59. Noting, now, that the corolla is composed of united petals, we are enabled to fix its position in the subdivision I.B, among orders 37 to 59. Next, the superior ovary shows that it must be located in the group I.B 2—orders 44 to 59; and as the stamens are attached to the corolla, we see at once that it is not a member of order 44. Turning now to the Synopsis of the Natural Orders (p. 17), we find that the irregular flowers of this group of orders occur only in 51, 52, 53, 54, and 56. Finally, the square stem, opposite leaves, and character of the fruit, show us that the plant must belong to the order *Labiatæ*.

The student should, as far as possible, deal with all flowers in this manner, assigning each one to its proper order; and, if he preserves his specimens for future observation, the names of the orders should always be attached, and the plants arranged

accordingly.

Again, should the reader meet with a common flower the name of which was previously known, while he is as yet ignorant as to the order to which it belongs; or, should he find a flower that he can at once identify by means of one of our illustrations; he should not rest satisfied on seeing that the name of the order is given beside the name of the plant, but turn to the synopsis, and note the distinguishing characters which determine the natural position of the plant. In this way he will cultivate the habit of careful observation; will make much more rapid progress in forming an acquaintance with plants in general, and will soon become familiar with those natural affinities which mark, more or less distinctly, a cousinship among the flowers.

To aid the reader in this part of his work we have given the name of the natural order with the name of every plant described; and, where difficulties are likely to occur in the identification of similar common species of the same genus, though perhaps only one member of the genus has been selected for description, a few notes are often included with the object of assisting in the identification of the others.

In our descriptions of wild flowers we do not always repeat those features which are common to the species of their respective orders. These features are, however, of the greatest importance; and thus it is essential that the reader makes himself acquainted with them, by referring to the synopsis of the orders, before noting those characters which are given as being more directly concerned in the determination of the species themselves. Thus, when we describe the Pasque Flower (p. 297) we do not refer to those general characters that apply to all the *Ranunculaceæ*

or Buttercup family, and which may be seen at once by referring to p. 17, but give all those details that are necessary to enable one to distinguish between the Pasque Flower and the other members of the same order.

Dicotyledons

(Leaves with netted veins. Parts of flower generally in fours or fives or multiples of four or five)

I. Flowers with both calyx and corolla.

A. Corolla composed of free and separate petals.

1. Stamens attached to base of flower, beneath the pistil—Orders 1-22.
2. Stamens attached above or around the pistil —Orders 23-36.

B. Corolla of united petals.

1. Ovary inferior.

a. Stamens on the corolla—Orders 37-41.
b. Stamens on the ovary—Orders 42-43.

2. Ovary superior.

a. Stamens free from the corolla—Order 44.
b. Stamens on the corolla—Orders 45-59.

II. Flowers with calyx or corolla or both absent.

A. Flowers with corolla absent, and, generally, with stamens and pistil in the same flower.

1. Ovary superior—Orders 60-64.

2. Ovary inferior—Orders 65-67.

B. Corolla and calyx usually absent. Stamens and pistil usually in separate flowers.

1. Flowers not in catkins—Orders 68-71.
2. Flowers in catkins—Orders 72-76.

Monocotyledons

(Leaves usually with parallel veins. Parts of flower in threes or multiples of three)

I. Perianth (see p. 11), coloured or petal-like, not scaly. (Sometimes absent.)

A. Ovary inferior.

1. Leaves with parallel veins—Orders 77-80.
2. Leaves with netted veins—Order 81.

B. Ovary superior—Orders 82-88.

II. Flowers without perianth, enclosed in scales or husks.

A. Grassy herbs, with solid stems; leaves forming unsplit sheaths round the stem; flowers in spikelets, with one to three stamens—Order 89.

B. Grassy herbs, with hollow stems; leaves generally forming split sheaths round the stem; flowers generally perfect, with three stamens—Order 90.

SYNOPSIS OF THE NATURAL ORDERS

1. RANUNCULACEÆ.—Herbs mostly with alternate

leaves and regular flowers. Sepals generally 5, distinct. Petals 5 or more. Stamens 12 or more. Pistil of many distinct carpels. Fruit of many one-seeded achenes. (The Buttercup Family.)

2. BERBERIDACEÆ.—Shrub with compound spines; alternate, spiny leaves; and pendulous flowers. Sepals 6. Petals 6. Stamens 6. Fruit a berry. (The Berberry Family.)

3. NYMPHÆACEÆ.—Aquatic plants with floating leaves and solitary flowers. Petals numerous, gradually passing into sepals outwards, and into stamens inwards. Ovary of many cells, with many seeds. (The Water-lily Family.)

4. PAPAVERACEÆ.—Herbs with a milky sap; alternate leaves without stipules; and regular (generally nodding) flowers. Sepals 2, deciduous. Fruit a capsule. Petals 4. Stamens many. Ovary one-celled, but with many membranous, incomplete partitions. (The Poppy Family.)

5. FUMARIACEÆ.—Herbs with much divided, exstipulate leaves; and racemes of small irregular, bracteate flowers. Sepals 2 or 0, deciduous. Petals 4, irregular. Stamens 6, in two bundles. Ovary of two carpels, one-celled. (The Fumitory Family.)

6. CRUCIFERÆ.—Herbs with alternate, exstipulate leaves, and racemes of regular flowers. Sepals 4. Petals 4, cruciform. Stamens 6, four longer and two shorter. Ovary one-or two-celled. Fruit a siliqua. (The Cabbage Family.)

7. RESEDACEÆ.—Herbs or shrubs with alternate, exstipulate leaves; and spikes of irregular, greenish flowers. Sepals 4 or 5, persistent. Petals 4 to 7, irregular. Stamens many. Ovary of 3 lobes, one-celled. (The Mignonette Family.)

8. CISTACEÆ.—Herbs or undershrubs with entire, opposite leaves; and conspicuous, regular flowers. Sepals 3 to 5. Petals 5, twisted in the bud. Stamens many. Ovary of 3 carpels, one-chambered. (The Rock-rose Family.)

9. VIOLACEÆ.—Herbs with alternate, stipuled leaves; and axillary, irregular flowers. Sepals 5, persistent. Petals 5, unequal, the lower one prolonged into a spur. Stamens 5. Ovary of three carpels, one-celled. (The Violet Family.)

10. DROSERACEÆ.—Small marsh plants with radical, glandular leaves; and cymes of small, white, regular flowers. Sepals 5. Petals 5. Stamens 5 or 10. Ovary of 3 to 5 carpels, one-celled. (The Sundew Family.)

11. POLYGALACEÆ.—Herbs with alternate, scattered, exstipulate, simple leaves; and racemes of irregular flowers. Sepals 5, the inner ones resembling petals. Petals 3 to 5, unequal. Stamens 8, in two bundles. Ovary two-celled. Fruit a capsule. (The Milkwort Family.)

12. FRANKENIACEÆ.—Herb with opposite, exstipulate leaves; and small, axillary, red, regular flowers. Sepals 4 to 6, united into a tube. Petals 4 to 6. Stamens 4 to 6. Ovary of 2 to 5 carpels, one-celled. (The Sea Heath.)

13. ELATINACEÆ.—Small aquatic herbs, with opposite, stipulate, spathulate leaves; and minute, axillary, red flowers. Sepals, petals and stamens 2 to 5. Fruit a capsule with 2 to 5 valves. (The Waterwort Family.)

14. CARYOPHYLLACEÆ.—Herbs mostly with jointed stems; opposite, simple leaves; and red or white, regular flowers. Sepals 4 or 5. Petals 4 or 5. Stamens 8 or 10. Styles 2 to 5. Fruit a one-celled capsule,

opening at top by teeth. (The Pink Family.)

15. LINACEÆ.—Herbs with slender stems; narrow, simple, entire, exstipulate leaves; and cymes of regular flowers. Sepals, petals, stamens, and carpels 4 or 5. Petals twisted in the bud, fugacious (falling early). Carpels each with two ovules. Fruit a capsule of 3 to 5 cells. (The Flax Family.)

16. MALVACEÆ.—Herbs or shrubs with alternate, stipuled leaves; and conspicuous, axillary, regular flowers. Sepals 5. Petals 5, twisted in the bud. Stamens many, united into a tube. Carpels many, each with one ovule. (The Mallow Family.)

17. TILIACEÆ.—Trees with alternate, stipuled, oblique, serrate leaves; a large bract adherent to the flower stalk; and cymes of greenish, regular flowers. Sepals and petals 5. Stamens many. Carpels 5, each with two ovules. (The Linden Family.)

18. HYPERICACEÆ.—Herbs or shrubs with opposite, simple, exstipulate leaves, often dotted with glands; and cymes of conspicuous yellow, regular flowers. Sepals 4 or 5, with glandular dots. Petals 4 or 5, twisted in the bud. Stamens many, united into several bundles. Carpels 3 to 5, with many ovules. Fruit a capsule with 3 to 5 cells. (The St. John's-wort Family.)

19. ACERACEÆ.—Trees with opposite, palmately-lobed leaves; and small, green, regular flowers. Sepals and petals 4 to 9. Stamens 8, on the disc. Fruit a samara. (The Maple Family.)

20. GERANIACEÆ.—Herbs with lobed, generally stipulate leaves; and conspicuous, regular flowers. Sepals 3 to 5, persistent. Petals 3 to 5. Stamens 5 to 10. Carpels 3 to 5, surrounding a long beak. (The Crane's-bill Family.)

21. BALSAMINACEÆ.—Herbs with simple, alternate leaves; and axillary, irregular, yellow flowers. Sepals 3 or 5, one forming a wide-mouthed spur. Petals 5, four of which are united in pairs. Stamens 5. Fruit a capsule with five elastic valves. (The Balsam Family.)

22. OXALIDACEÆ.—Low herbs, with radical, generally trifoliate leaves; and axillary, regular flowers. Sepals 5. Petals 5, united at the base. Stamens 10. Ovary five-celled, with many ovules. (The Wood Sorrel Family.)

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23. CELASTRACEÆ.—Trees or shrubs, with opposite leaves; and small, regular flowers in axillary cymes. Sepals and petals usually 4. Stamens usually 4, alternating with the petals. Carpels 4. Fruit a fleshy capsule. (Spindle Tree.)

24. RHAMNACEÆ.—Shrubs with simple leaves; small, greenish flowers; and berry-like fruit. Sepals, petals, and stamens 4 or 5. Stamens opposite the petals. Ovary superior, three-celled, with one ovule in each cell. (The Buckthorn Family.)

25. LEGUMINOSÆ.—Herbs or shrubs with alternate, stipuled leaves, generally pinnate or ternate, often tendrilled; and papilionaceous (butterfly-like) flowers. Sepals 5, combined. Petals 5, irregular. Stamens generally 10, all, or nine of them united. Ovary superior. Fruit a pod. (The Pea Family.)

26. ROSACEÆ.—Trees, shrubs, or herbs with alternate, stipuled leaves; and conspicuous, regular flowers. Sepals 4 or 5. Petals 4 or 5. Stamens many. Carpels 1, 2, 5, or many. (The Rose Family.)

27. ONAGRACEÆ.—Herbs with mostly entire, simple,

exstipulate leaves; and conspicuous, regular flowers. Sepals 2 to 4. Petals 2 to 4, twisted in the bud, or absent. Stamens 2 to 4, or 8. Ovary inferior, with carpels 1 to 6 (usually 4), many-seeded. (The Willow-herb Family.)

28. HALORAGIACEÆ.—Aquatic herbs with whorled leaves and minute flowers. Sepals 2 to 4 or absent. Petals 2 to 4 or absent. Stamens 1, 2, 4, or 8. Ovary inferior. Carpels 1 to 4. (The Mare's-tail Family.)

29. LYTHRACEÆ.—Herbs with opposite or whorled, entire leaves; and conspicuous, regular flowers. Sepals, and petals 3 to 6. Stamens generally twice as many as petals. Ovary superior. Carpels 2 to 6. Fruit a many-seeded capsule. (The Loosestrife Family.)

30. TAMARISCACEÆ.—Shrub with minute, scale-like leaves; and lateral spikes of small, regular flowers. Sepals and petals 4 or 5. Stamens 4 to 10, on the disc. Styles 3. (The Tamarisk.)

31. CUCURBITACEÆ.—Rough, climbing herb, with tendrilled, palmately-lobed leaves; greenish, diœcious flowers in axillary racemes; and scarlet berries. Sepals and petals 5, united. Stamens 3. Ovary inferior. Carpels 3. (The White Bryony.)

32. SAXIFRAGACEÆ.—Shrubs and herbs with regular flowers. Sepals and petals 4 or 5. Stamens 4 or 10. Carpels 2 or 4, united. (The Saxifrage Family.)

33. CRASSULACEÆ.—Succulent herbs with simple leaves; and small, regular, starry flowers. Sepals, petals, and carpels 3 to 20, usually 5. Stamens twice as many as the petals. Carpels superior, forming follicles. (The Stonecrop Family.)

34. ARALIACEÆ.—Climbing shrub with clinging rootlets, evergreen leaves, umbels of yellowish

flowers, and black berries. Sepals, petals, stamens, carpels, and seeds 5 each. Ovary inferior. (The Ivy.)

35. CORNACEÆ.—Herbs and shrubs with opposite leaves, small flowers, and berry-like fruits. Sepals, petals, and stamens 4 or 5. Ovary inferior. Carpels 2, each with one ovule. (The Dogwood Family.)

36. UMBELLIFERÆ.—Herbs with mostly compound, pinnate leaves, sheathing at the base; and compound umbels of small, white flowers. Sepals, petals, and stamens 5. Ovary inferior. Fruit of two adhering carpels. (The Parsley Family.)

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37. CAPRIFOLIACEÆ.—Shrubs and herbs with opposite leaves, and conspicuous (sometimes irregular) flowers. Sepals and petals 3 to 5. Stamens 4 to 10. Fruit a berry. (The Honeysuckle Family.)

38. RUBIACEÆ.—Herbs with whorled leaves; and small, regular flowers. Sepals, petals, and stamens 4 to 6. Carpels 2. (The Bedstraw Family.)

39. VALERIANACEÆ.—Herbs with opposite leaves and small (sometimes irregular) flowers. Sepals 3 to 5, often downy. Petals 3 to 5. Stamens 1 or 3. Ovary of three carpels, one-celled. (The Valerian Family.)

40. DIPSACEÆ.—Herbs with opposite leaves; and heads of small flowers, mostly blue. Calyx enclosed in a whorl of scaly bracts. Petals 4 or 5. Stamens 4, free. Ovary one-celled and one-seeded. (The Teasel Family.)

41. COMPOSITÆ.—Herbs with heads of small flowers with tubular or strap-shaped corollas. Calyx absent or represented by a whorl of silky hairs (pappus).

Stamens 4 or 5, anthers generally united. (The Daisy Family.)

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42. CAMPANULACEÆ.—Herbs with milky sap; alternate, entire, scattered leaves; and usually conspicuous, blue, regular flowers. Sepals, petals, and stamens 5. Ovary of 2 to 8 carpels. (The Bellflower Family.)

43. VACCINIACEÆ.—Low (mostly mountainous) shrubs, with scattered, simple, alternate leaves; small drooping, reddish or pink, regular flowers; and edible berries. Sepals, petals, and carpels 4 or 5. Stamens 8 or 10. (The Cranberry Family.)

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44. ERICACEÆ.—Shrubs or herbs with opposite or whorled, evergreen leaves; and small conspicuous, regular, flowers. Sepals, petals, and carpels 4 or 5. Stamens 5 to 10. (The Heath Family.)

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45. AQUIFOLIACEÆ.—Shrub with evergreen, spiny leaves; and small, greenish, regular flowers. Sepals, petals, stamens, and carpels 4 or 5. Fruit berry-like, with one-seeded stones. (The Holly.)

46. OLEACEÆ.—Trees or shrubs with opposite leaves; and small, regular flowers. Sepals and petals 4, sometimes absent. Stamens 2. Fruit a berry or a samara. (The Olive Family.)

47. APOCYNACEÆ.—Slender, prostrate shrubs, with

milky sap; opposite, evergreen, entire leaves; and conspicuous, regular, purple flowers. Sepals, petals, and stamens 5. Corolla salver-shaped. (The Periwinkle Family.)

48. GENTIANACEÆ.—Bitter herbs with opposite, simple, entire leaves; and regular, conspicuous flowers. Sepals, petals, and stamens 4 to 10. Carpels 2. Fruit a capsule. (The Gentian Family.)

49. CONVOLVULACEÆ.—Herbs, generally twining, with alternate, simple leaves (sometimes absent); and mostly conspicuous, regular flowers. Sepals, petals, and stamens 4 or 5. Ovary two-or four-celled. Fruit a four-seeded capsule. (The Bindweed Family.)

50. SOLANACEÆ.—Herbs or shrubs with alternate leaves, and axillary cymes of regular flowers. Sepals, petals, and stamens 5. Ovary two-celled. Fruit berry-like or a capsule, many seeded. (The Nightshade Family.)

51. SCROPHULARIACEÆ.—Herbs with mostly irregular, lipped flowers. Sepals and petals 4 or 5. Stamens 2, or 4, two longer than the others. Carpels 2. Fruit a many-seeded capsule. (The Figwort Family.)

52. OROBANCHACEÆ.—Fleshy, brown, parasitic plants, with scattered scale-leaves; and mostly brownish, irregular flowers. Sepals 4 or 5. Petals 5, lipped. Stamens 4, two longer than the others. Carpels 2. Fruit a one-chambered, many-seeded capsule. (The Broom-rape Family.)

53. VERBENACEÆ.—An erect, branched herb, with opposite leaves; and a compound spike of small, irregular flowers. Sepals and petals 5. Corolla lipped. Stamens 4, two longer than the others. Ovary four-celled. Fruit of 4 nutlets. (The Vervain.)

54. LABIATÆ.—Herbs, mostly aromatic, with square stems, opposite leaves, and whorls or cymes of irregular flowers. Sepals and petals 5. Corolla usually lipped. Stamens 4 (rarely 2), two longer than the others. Fruit of 4 one-seeded nutlets. (The Dead Nettle Family.)

55. BORAGINACEÆ.—Herbs, mostly rough, with alternate, simple leaves; and spikes of conspicuous, regular flowers. Sepals, petals, and stamens 5. Carpels 2. Fruit of 4 one-seeded nutlets. (The Borage Family.)

56. LENTIBULARIACEÆ.—Insectivorous, marsh herbs, with radical, entire leaves, or much-divided floating leaves with bladders; and conspicuous, irregular flowers. Sepals and petals 5. Corolla usually lipped. Stamens 2. Fruit a one-chambered, many-seeded capsule. (The Butterwort Family.)

57. PRIMULACEÆ.—Herbs, mostly with radical leaves; and conspicuous, regular flowers. Sepals, petals, and stamens 4 to 9. Stamens opposite the petals. Ovary one-celled, with free central placenta. Fruit a many-seeded capsule. (The Primrose Family.)

58. PLUMBAGINACEÆ.—Herbs, mostly maritime, with radical or alternate leaves; and mostly blue, regular flowers. Sepals, petals, and stamens 5. Stamens opposite the petals, and usually free. Carpels 3 to 5. Ovary one-celled and one-seeded. (The Thrift Family.)

59. PLANTAGINACEÆ.—Herbs with (generally) simple, entire, radical leaves; and spikes of greenish flowers. Sepals, petals, and stamens 4. Corolla scaly. Carpels usually 2 or 4. Fruit a one-to four-chambered capsule. (The Plantain Family.)

Note.—Plants in which calyx or corolla are, or appear

to be, absent occur in orders 1, 6, 14, 26, 27, 28, 29, and 32.

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60. AMARANTHACEÆ.—A smooth, prostrate herb, with scattered, stalked, exstipulate, simple leaves; and small, axillary, green, monœcious flowers. Sepals and stamens 3 to 5. (The Amaranth.)

61. CHENOPODIACEÆ.—Herbs with simple, exstipulate leaves, or leafless, jointed stems; and small green flowers. Sepals 3 to 5, persistent. Stamens 1 to 5, opposite the sepals. Fruit indehiscent. (The Goosefoot Family.)

62. POLYGONACEÆ.—Herbs with sheathing stipules; alternate, simple leaves; and small flowers. Sepals 3 to 6, green or coloured, usually persistent. Stamens 5 to 8. Fruit indehiscent. (The Dock Family.)

63. ELEAGNACEÆ.—A shrub with silvery scales; alternate, entire, exstipulate leaves; and inconspicuous, diœcious flowers. Sepals 2 to 4, persistent. Stamens 4. Fruit berry-like. (The Sea Buckthorn.)

64. THYMELACEÆ.—Shrubs with tough inner bark; simple, entire, exstipulate leaves; and conspicuous, perfect, sweet-scented flowers. Sepals 4. Stamens 8. Fruit berry-like. (The Spurge Laurel Family.)

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65. LORANTHACEÆ.—A green, parasitic, much branched shrub, with opposite, simple, entire leaves; inconspicuous, diœcious flowers; and whitish viscid berries. Sepals and stamens 4. Ovary one-chambered.

Berry one-seeded. (The Mistletoe.)

66. ARISTOLOCHIACEÆ.—Herbs and climbing shrubs, with alternate leaves and perfect flowers. Sepals 2 or 3, sometimes coloured, sometimes lipped. Ovary with 4 to 6 chambers, containing many ovules. (The Birthwort Family.)

67. SANTALACEÆ.—A slender, prostrate, root-parasite, with alternate, linear leaves; and inconspicuous, perfect flowers. Sepals and stamens 4 or 5. Ovary one-celled. Fruit dry, one-seeded. (The Bastard Toad-flax.)

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68. EMPETRACEÆ.—A mountain, evergreen, resinous shrub, with alternate, narrow leaves; and inconspicuous, diœcious flowers. Perianth of 6 scales. Stamens 3. Ovary of 3 to 9 cells, with one ovule in each cell. (The Crowberry.)

69. EUPHORBIACEÆ.—Trees, shrubs, or herbs, generally with a milky sap; simple, entire leaves; and small, inconspicuous flowers, sometimes enclosed in calyx-like bracts. Perianth of 3 or 4 parts, or absent. Stamens 1 or many. Fruit separating into 2 or 3 carpels elastically. (The Spurge Family.)

70. URTICACEÆ.—Herbs, often with simple, stinging leaves; and small, green, clustered, unisexual flowers. Stamens 4 or 5, opposite the sepals. Ovary superior, one-celled. Fruit indehiscent. (The Nettle Family.)

71. ULMACEÆ.—Trees with alternate, distichous leaves, and perfect flowers. Perianth of 4 or 5 parts, bell-shaped. Stamens 4 or 5. Ovary superior, with one or two cells. Fruit a thin, one-seeded samara. (The Elm Family.)

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72. CUPULIFERÆ.—Trees or shrubs with alternate, stipuled, simple leaves; and small, green flowers. Perianth of 5 or 6 parts. Stamens 5 to 20. Fruit a nut, enclosed in a tough cupule. (The Oak Family.)

73. BETULACEÆ.—Trees or shrubs with alternate leaves and small flowers. Stamens 1 or more. Fruit small, indehiscent, winged, not enclosed in a cup. (The Birch Family.)

74. SALICACEÆ.—Trees with alternate, simple leaves; and flowers which generally appear before the leaves. Stamens one or more to each scale. Fruit many-seeded, not enclosed in a cup. (The Willow Family.)

75. MYRICACEÆ.—A small aromatic shrub, with alternate, simple leaves; and inconspicuous flowers. Stamens 4 to 8. Fruit a drupe. (The Bog Myrtle.)

76. CONIFERÆ.[1]—Shrubs or trees with rigid evergreen, linear leaves; and resinous juices. Male flowers in catkins. Female flowers generally in cones. Seeds not enclosed in an ovary. (The Pine Family.)

[1] The members of the Pine family do not really belong to the Dicotyledons, although their stems increase in thickness in the same way as those of our other trees and shrubs. They belong to the *Gymnosperms* (naked-seeded group), in which the seeds are not produced in ovaries; but it is more convenient, for our present purpose, to place them near our other forest trees.

77. ORCHIDACEÆ.—Herbs mostly with tuberous

roots, and conspicuous, irregular, perfect flowers in spikes or racemes. Sepals, petals, and carpels 3. Stamens 1 or 2, united to the style. (The Orchid Family.)

78. IRIDACEÆ.—Herbs with fleshy, underground stems; narrow leaves; and handsome, irregular, perfect flowers. Perianth of 6 parts. Stamens and carpels 3. Ovary 3-celled. Fruit a many-seeded capsule with three valves. (The Iris Family.)

79. AMARYLLIDACEÆ.—Herbs with bulbs, narrow leaves, and handsome, regular, perfect flowers. Perianth of 6 parts. Stamens 6. Ovary 3-celled. Fruit a 3-valved capsule. (The Narcissus Family.)

80. HYDROCHARIDACEÆ.—Aquatic herbs, with floating or submerged leaves; and conspicuous, regular, diœcious flowers. Sepals and petals 3. Stamens 3 to 12. Carpels 3 or 6. Fruit a berry. (The Frog-bit Family.)

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81. DIOSCORIACEÆ.—A climbing herb, with broad, glossy leaves; and small, monœcious flowers. Sepals, petals, and carpels 3. Stamens 6. Ovary 3-celled. Fruit a berry. Seeds 6. (The Black Bryony.)

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82. LILIACEÆ.—Herbs with mostly narrow leaves, and conspicuous, regular, perfect flowers. Perianth of 6 parts, Stamens 6. Ovary 3-celled. Fruit a berry or capsule. (The Lily Family.)

83. ALISMACEÆ.—Aquatic plants with radical, net-

veined leaves; and conspicuous, white, perfect flowers. Perianth of 6 parts. Stamens 6 or more. Carpels numerous, and distinct or nearly so. (The Water-plantain Family.)

84. NAIDACEÆ.—Aquatic plants with mostly floating or submerged leaves; and inconspicuous flowers. Perianth of 4 to 6 scales, or absent. Stamens and carpels 1 to 6. (The Pond-weed Family.)

85. LEMNACEÆ.—Minute floating plants, with green, cellular fronds, rarely flowering. Flowers very small, enclosed in a bract. Stamen 1. Ovary one-celled. Ovules 1 to 7. (The Duckweed Family.)

86. ARACEÆ.—Herbs with net-veined, radical leaves; and small flowers on a fleshy spadix enclosed in a leafy sheath. Perianth of 6 parts, or absent. Stamens 1 to 6. Ovary of one to three cells. Fruit berry-like. (The Cuckoo Pint Family.)

87. TYPHACEÆ.—Erect marsh plants, with long, narrow leaves; and small monœcious flowers in conspicuous spikes or heads. Perianth absent. Stamens many. Fruit a one-seeded drupe. (The Reed-mace Family.)

88. JUNCACEÆ.—Rush-like herbs, with cylindrical or narrow leaves, and small, brown flowers. Perianth membranous, of 6 parts. Stamens 6. Carpels 3. Fruit a 3-valved capsule. (The Rush Family.)

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89. CYPERACEÆ.—Grassy herbs, with usually solid, triangular stems; and linear leaves, with tubular sheaths. Flowers in spikelets, unisexual or perfect. Stamens 1 to 3. Carpels and stigmas 2 or 3. (The Sedge Family.)

90. GRAMINEÆ.—Grassy herbs, with hollow stems; and linear leaves, with split sheaths. Flowers usually perfect. Stamens usually 3. Stigmas 1 or 2. (The Grass Family.)

II

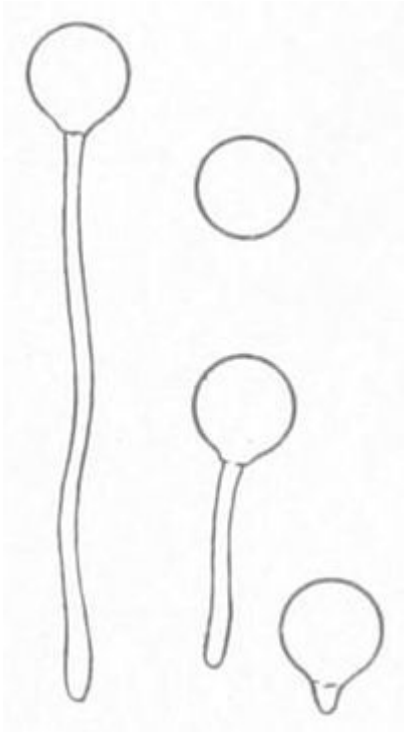
THE POLLINATION AND FERTILISATION OF FLOWERS

Since flowers are the reproductive organs of the plant it seems only natural to suppose that the wonderful variety of colour and form which they exhibit might have some connexion with the processes concerned in the propagation of their respective species, and the more we study the nature of the flowers and observe the methods by which pollen is transferred from stamens to stigmas, the stronger becomes our conviction that the diversities mentioned are all more or less connected with the one great function of reproduction.

This being the case, we propose to devote a short chapter to a simple account of the uses of the parts of a flower, and to the various contrivances on the part of the plant to secure the surest and best means of perpetuating the species.

It has already been stated that the stamens produce

pollen cells, and that the ovary contains one or more ovules. As soon as the anthers are mature, they open and set free the pollen cells they contained. A stigma is said to be mature when it exposes a sticky surface to which pollen cells may adhere, and on which these cells will grow. When a pollen cell has been transferred to such a stigma, it is nourished by the fluid secreted by the latter, and sends out a slender, hollow filament (the pollen tube) which immediately begins to descend through the stigma, and through the style, if any, till it reaches the ovary.



Pollen Cells throwing out their Tubes.

Should the reader desire to watch the growth of the pollen tubes, he can easily do so by shaking some pollen cells (preferably large ones, such as those of some lilies) on to a solution of sugar, and watching them at intervals with the aid of a lens. In the course of a few hours the pollen tubes will be seen to protrude, and these eventually grow to a considerable length.

In order that the ovules of a flower may develop into seeds, it is necessary that they become impregnated by pollen from the anthers of the same species, and this is brought about in the following manner: The

pollen cells having been transferred by some means to the mature stigma, they adhere to the surface of the latter, and, deriving their nourishment from the secretion of the stigmatic cells, as above described, proceed to throw out their tubes. These tubes force their way between the cells of the stigma and style, and enter the ovary. Each tube then finds its way to one of the ovules, which it enters by means of a minute opening in its double coat called the micropyle, penetrates the embryo-sac, and reaches the ovum or egg-cell. The ovule is now impregnated or fertilised, and the result is that the ovum divides and subdivides into more and more cells till at last an embryo plant is built up. The ovule has thus become a seed, and its further development into a mature plant depends on its being transferred to a suitable soil, with proper conditions as to heat and moisture.

If the flower concerned is a perfect one, and the ovules are impregnated by pollen from its own anthers, it is said to be self-fertilised; but if the pollen cells that fertilise the ovules have been transferred from a distinct flower, it is said to be cross-fertilised.

Now, it has been observed that although self-fertilisation will give rise to satisfactory results in some instances, producing seeds which develop into strong offspring, cross-fertilisation will, as a rule, produce better seeds. In fact, self-fertilisation is not at all common among flowers, and the pollen has frequently no effect unless it has been transferred from another flower. In a few cases it has been found that the pollen even acts as a poison when it is deposited on the stigma of the same flower, causing it to shrivel up and die. In many instances the

structure and growth of the flower is such that self-pollination is absolutely impossible; and where it is possible the seedlings resulting from the process are often very weak.

It has already been hinted that the wonderful variety of form and colour exhibited by flowers has some connexion with this important matter of the transfer of pollen, and the reader who is really interested in the investigation of the significance of this great diversity will find it a most charming study to search into the advantages (to the flower) of the different peculiarities presented, especially if he endeavours to confirm his conclusions by direct observations of the methods by which the pollen cells are distributed to the stigmas.

Pollen cells are usually distributed either by the agency of the wind or by insects; and it is generally easy to determine, by the nature of the flower itself, which is the method peculiar to its species.

A wind-pollinated flower is generally very inconspicuous. It produces no nectar, which forms the food of such a large number of insects, and has no gaudy perianth, nor does it emit any odour such as would be likely to attract these winged creatures. Its anthers generally shed an abundance of pollen, to compensate for the enormous loss naturally entailed in the wasteful process of wind-distribution, and the pollen is so loosely attached that it is carried away by the lightest breeze. Further, the anthers are never protected from the wind, but protrude well out of the flower; and the stigma or stigmas, which are also exposed, have a comparatively large area of sticky surface, and are often hairy or plumed in such a manner that they form effectual traps for the capture of the floating pollen cells.

An insect-pollinated flower, on the other hand, has glands (*nectaries*) for the production of nectar, and its perianth is usually of such a conspicuous nature that it serves as a signal to attract the insects to the feast. (In some instances the individual flowers are very small, but these are generally produced in such clusters that they become conspicuous through their number.) Often it emits a scent which assists in guiding the insects to their food. Its stamens are generally so well protected by the perianth that the pollen is not likely to be removed except by the insects that enter the flower; and the supply of pollen is usually not so abundant as in the wind-pollinated species, for the insects, travelling direct from flower to flower, convey the cells with greater economy. The stigmas, too, are generally smaller, and are situated in such a position that, when mature, they are rubbed by that portion of the insect's body which is already dusted with pollen.

As we watch the nectar-feeding insects at work, we not only observe that the flowers they visit possess the general characters given above as common to the insect-pollinated species, but also that, in many instances, the structure of the flower is such that the transfer of pollen from anthers to stigma could only be accomplished by the particular kind of insect which it feeds. Various contrivances are also adopted by many flowers to attract the insects which are most useful to them, and to exclude those species which would deprive them of nectar and pollen without aiding in the work of pollination. Thus, some flowers are best pollinated by the aid of certain nocturnal insects, which they attract at night by the expansion of their pale-coloured corollas and by the emission of fragrant perfumes. These close their petals by day in order to economise their stores and protect their

parts from injury while their helpers are at rest. Others require the help of day-flying insects: these are expanded while their fertilisers are on the wing, and sleep throughout the night.

We do not propose to give detailed accounts of the various stratagems by which flowers secure the aid of insects in this short chapter. Several examples are given in connexion with the descriptions of flowers in subsequent pages, but a few typical instances, briefly outlined here, will give the reader some idea of features which should be observed as flowers are being examined.

In many flowers the anthers and the stigma are not mature at the same time, and consequently self-pollination is quite impossible. With these it often happens that the anthers and stigma alternately occupy the same position, so that the same part of the body of an insect which becomes dusted with pollen in one flower rubs against the stigma of another.

Other flowers, such as the Forget-me-not, in which both stamens and stigma are ripe together, project their stigmas above the stamens at first, in order that an insect from another flower might touch the stigma before it reaches the stamens, and thus cross-pollinate them; and their stamens are afterwards raised by the lengthening of the corolla until they touch the stigma. Thus the flowers attempt to secure cross-pollination; but, failing this, pollinate themselves.

In the Common Arum or Cuckoo Pint, described on p. 106, we have an example of a flower of peculiar construction, surrounded by a very large bract in which insects are imprisoned and fed until the anthers are mature, and then set free in order that

they might carry the pollen to another flower of which the stigmas are ripe.

Sometimes the flowers of the same species assume two or three different forms as far as the lengths of the stamens and pistils are concerned, the anthers of one being of just the same height as the stigma of another, so that the pollen from the former will dust that portion of the body of the insect which rubs against the latter Examples are to be found among the Primulas, and in the Purple Loosestrife, both of which are described in their place.

In some flowers the stamens are irritable, rising in such a manner as to strike the insects that visit them; and in these cases the anthers almost invariably deposit pollen on that portion of the insect's body which is most likely to come in contact with the stigma of the next flower visited. Again, in Sages, the anthers are so arranged that they are made to swing, as on a see-saw, to exactly the same end.

These few examples will suffice to show that the structure and conformation of flowers are subservient to the one great purpose of securing the most suitable means of the distribution of pollen, and the student who recognises and studies the various forms of flowers in this connexion will find his work in the field doubly interesting.

III

CLIMBING PLANTS

Many plants have stems which grow to a considerable length, and which are at the same time too weak to support the plants in the erect position. A considerable number of these show no tendency to assume an upward direction, but simply trail along the surface of the ground, often producing root fibres at their nodes to give them a firmer hold on the soil and to absorb additional supplies of water and mineral food. Some, however, grow in the midst of the shrubs and tall herbage of thickets and hedgerows, or in some other position in which it becomes necessary to strive for a due proportion of light, and such plants would stand but a small chance in the struggle for existence if they did not develop some means of securing a favourable position among their competitors.

These latter are collectively spoken of as climbing plants; but it is interesting to note that in their seedling stage they are all erect, and it is only after they reach a certain height that they commence to assume some definite habit by which they obtain the necessary support, or to develop special organs by which they can cling to objects near them.

Some climbers produce no special organs for the purpose of fastening themselves to surrounding objects, but trust entirely to the wandering and more or less zig-zag nature of their feeble stems, and thus reach the open light merely by a process of interweaving, as in the case of the Hedge Bedstraw (*Galium mollugo*). Others adopt this same method of interweaving, but at the same time develop some

kind of appendages to give them additional support. Thus, the Rough Water Bedstraw (*G. uliginosum*), which sometimes reaches a height of four or five feet, has recurved bristles all along its slender stem, and these serve as so many little hooks, holding the plant securely on to the neighbouring rank herbage of the marsh or swamp in which it grows, while the rigid leaves further assist by catching in the angles of surrounding stems.

Another good example is to be seen in the common Goose-grass or Cleavers (*G. aparine*) of our hedgerows, which also reaches a height of four or five feet, and clings very effectually by means of the hooked bristles of its stems and leaves.

The Marsh Speedwell (*Veronica scutellata*), though it grows to a height of only one foot, is too weak to stand erect without support, and it has quite a novel method of securing the aid of the plants among which it grows. Its two topmost leaves at first stand erect over the terminal bud, so that they are easily pushed through the spaces in the surrounding herbage as the stem lengthens. They then diverge, and even turn slightly downwards, thus forming two supporting arms, the holding power of which is further increased by the down-turned teeth of their margins. This process is repeated by the new pairs of leaves formed at the growing summit of the stem, with the result that the plant easily retains the erect position.



PRICKLES OF THE WILD ROSE.

The Wild Roses and Brambles growing in the hedgerows support themselves among the other shrubby growths by the interlacing of their stems, but are also greatly aided by the abundance of prickles with which these stems are armed. The prickles, even if erect, would afford considerable assistance in this respect; but it may be observed that they are generally directed downwards, and often very distinctly curved in this direction, and so serve to suspend the weak stems at numerous points.

We often find the Bramble growing in abundance on

heaths and downs, in situations where suitable props do not exist. In this case the younger shrubs simply trail along the ground, or form low arches as the weight of the stems and their appendages cause the apex to bend to the ground. Yet if we turn to the older shrubs of several years' growth we find that they have succeeded in reaching a height of some feet. The first stems of these shrubs formed low arches as we have just described, and then they gave rise to branches which were first erect, but were afterwards bent downwards in the same manner, forming arches rising higher than their predecessors. This continued, year after year, till at last a long series of stems, forming arch above arch, reached the present height, the older stems, at the bottom, now dead, serving to support the whole mass above.



IVY, SHOWING THE ROOTLETS OR SUCKERS.

Some climbing stems produce little roots by means of which they can cling firmly to available supports. Such are very common among tropical plants, but our Ivy affords a splendid example. The roots so formed may appear in clusters at special points of the stem, or in long lines running longitudinally on it, and they are produced on trailers as well as on climbers. In fact, we can draw no fine distinction between the former and the latter in this respect, and even the Ivy will sometimes trail along the ground after the manner of the Periwinkle, which roots itself at several points as it proceeds.

The rootlets of the Ivy and other climbers of the same habit always avoid the light; and if they are not originally formed on the side of the stem facing the supporting surface, they soon turn towards the latter, and give rise to little clinging suckers that firmly adhere. If they come in contact with a bare rock, or with a surface from which no nutriment can be derived, they serve the one purpose of clinging only; but if they reach even a small amount of nutritive soil, they produce absorbent fibres that are capable of extracting food.

The ivy usually clings to the bark of trees or to old walls, the crevices of which often contain some small amount of transported soil, or more or less organic soil formed by the growth and decay of low forms of vegetable life; and thus the tree is enabled to obtain a little food from the objects that give it the necessary mechanical support.

The well-known Virginian Creeper (*Ampelopsis*) produces rootlets by means of which it can cling to very smooth surfaces. Its light-avoiding 'tendrils' always turn to the wall or other supporting body; and, on coming in contact with it, give off little

branches which diverge like the toes of the tree-frog, and produce little adhesive discs which hold on firmly by the aid of a sticky secretion.

Perhaps the most interesting of all climbing plants are those which twine their stems around the props afforded by the neighbouring growths. As before stated, the stems of these plants are erect when very young; but after they have reached a certain height the top of the stem bends to one side, and then, as the growth proceeds, it turns slowly round and round, describing a circle in the horizontal plane, thus seeking some support round which it can twine.

The rate at which the top of the stem revolves varies in different plants, and also in the same plant according to the temperature and other conditions affecting the growth. In some species the upper portion describes a complete circle in less than two hours during warm weather, while in others a single revolution may occupy one or two days.

It will be seen, from the nature of these movements, that the revolving stem is far more likely to come in contact with erect, rather than with horizontal supports, and observations made on twining stems will show that they seldom fix themselves round supports which are placed horizontally or only on a slight incline. In fact, some of these stems seem quite unable to twist themselves spirally except round an axis that is either erect or forms a very large angle with the horizontal plane.

Should the twining stem succeed in reaching a favourable prop, it immediately commences to bend itself round and round, forming a more or less compact spiral; and it is probable that the slight pressure, caused by the contact, acts as a stimulus which incites the peculiar mode of growth.

The direction which the spiral takes is not always the same. In the Hop, Honeysuckle, and the Climbing Buckwheat or Black Bindweed, the direction is always the same as that of the hands of a clock; while in the Bindweeds the spiral is invariably contra-clockwise. Further, it is not possible to compel any species to turn in a direction opposite to that which it naturally follows. Its stem may be forcibly twined in the wrong direction any number of times, but the free end will always follow its natural course as soon as it is left undisturbed.



STEM OF THE BINDWEED, TWINING TO THE LEFT.

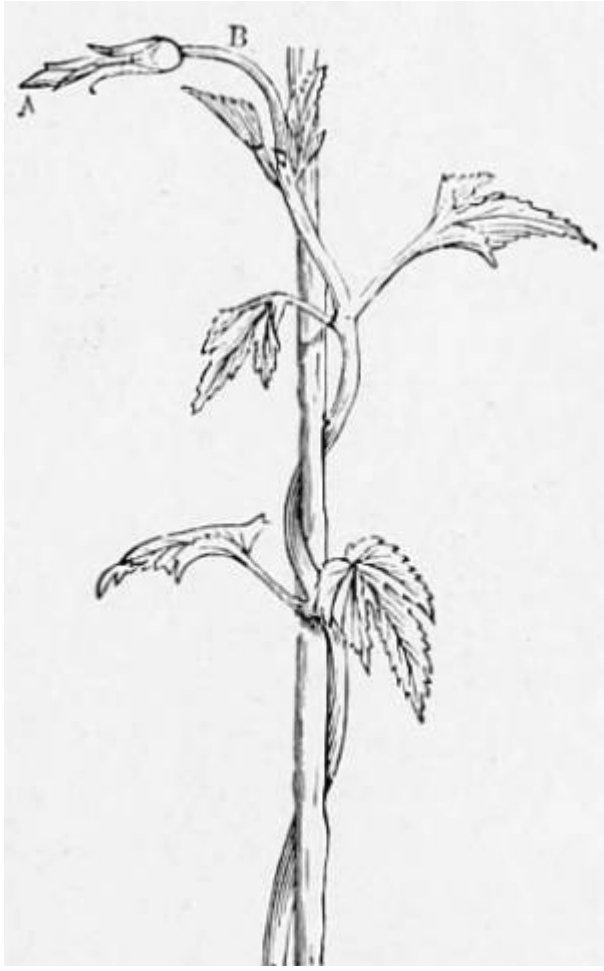
Should the stem of a young twining plant fail to reach a suitable support, it bends over, not being sufficiently rigid to support itself, and at last the apex reaches the ground. Then, starting afresh from this second position of rest, it begins to ascend, and its upper end again commences to revolve as before.

The chances are that it will, from this second position, find something round which it can twine; but failing this its summit may again and again bend to the ground, thus renewing its attempts from various positions more or less distant from one another, and in each effort so made the revolving upper end of the stem gradually lengthens, and describes a larger and larger circle in search for a favourable prop.

A twining stem sometimes has the advantage of additional support afforded by the stiff nature of the base of the stem, which is often rendered still more rigid by a twist or torsion resembling that of the strands of a rope. Such advantage is often still further increased by the presence of longitudinal ridges of the stem, frequently bearing rows of hooked prickles or hairs that hold on to any object touched. Again, the base of the stem, even though it reaches nothing round which it can twine, sometimes takes the form of a spiral, thus forming a good foundation for the upper portion as it seeks out a convenient prop. Yet another contrivance to secure the same end may be observed in the Greater Bindweed and some other plants. The stems, failing to secure a favourable hold, twine round one another, thus producing a kind of rigid cable for the support of the upper extremities as they revolve in order to find stems round which to form their spirals.

Should all the methods and contrivances of the twining plant fail it in its attempts to secure an uppermost place among the surrounding herbage or shrubs, it is compelled to trail along the ground. But such a position is most disadvantageous and unnatural to it, and usually results in a stunted and sickly plant that may produce no flowers.

Most of the twining plants of our country are of short duration. Many, like the Climbing Buckwheat, are annuals; while others, as the Hop and the Bindweeds, though they have perennial roots, produce fresh stems each season. The Honeysuckle and the Bittersweet, however, have perennial, woody stems which increase in thickness year by year, though the latter does not twine very much, and seems to take an intermediate place between the typical twiners and the plants which support themselves by merely interlacing their stems with the neighbouring plants or shrubs.



STEM OF THE HOP, TWINING TO THE RIGHT.

Some twining stems are unable to form their spirals round thick supports, and after making some attempt to do so grow off at a tangent to seek some less bulky prop. It has been observed, for instance, that the Hop cannot grasp a pole that is more than four inches in diameter.

In many cases, too, the spirals of the twining stem increase in diameter after they are first formed, and can thus adapt themselves to the increasing size of a living stem round which they have grown. The spirals of the Honeysuckle, however, do not increase in this way; and consequently, when they surround the trunk or branch of a young tree, the latter is constricted, often to such an extent that it is strangled and becomes stunted in its growth.

Another class of climbing plants cling to their surroundings by means of tendrils, which are modifications of leaves or shoots that grow spirally like the stems we have been considering.

Whatever be the origin of a tendril, it generally grows straight until it has reached some favourable support, and in order to obtain such support it performs circular movements similar to those of the tips of twining stems. Like these stems, too, the tendril is always sensitive, and forms a close spiral round the object it touches.

Some tendrils will grow spirally without ever touching a support, but these often become stunted and wither, while those which reach and embrace a stem or other structure are apparently incited to a luxuriant growth by the stimulating effect of the pressure produced.

When the tip of a tendril is successful in gripping a stem firmly, the portion behind it often takes part in the spiral movement, thus becoming shorter, and pulling the support towards its own plant in such a manner as to bring it within the reach of additional tendrils.

Of course the tendrilled plants have a much better chance of securing a suitable support than the

twiners, for the latter have to depend on the searching and clinging powers of but one structure, while the tendrils are usually very numerous on the same plant, and throw themselves out in all directions in search of the required aid. The production of tendrils as a means of support is also much more economical than the method of clinging by a twining stem, for the former are usually very slender, while the latter must necessarily be sufficiently thick to convey the nutritive requirements of the whole plant; and thus the process of clinging by tendrils is more in accordance with the usual economy of Nature.

We have observed that twining stems can, as a rule, twine round only those supports which are erect or nearly so. This is not the case with tendrils, which are better adapted for twisting round horizontal stems and leafstalks. Often, too, they pass from one branch or leaf to another, and so secure the plant to which they belong by fastenings both above and below. Further, while the clasping part of a tendril often becomes hard and rigid, the portion between this and the plant may remain green and flexible. This latter portion also frequently forms a new spiral in the opposite direction, thus rendering the connexion between the plant and its support so supple and elastic that no damage is likely to accrue from the motions caused by the wind.

The tendrils which form long spirals are generally modified stems or leaves, or they may be elongated leaflets of a compound leaf. Those which are modified stems may be distinguished by their growth from the axils of the leaves, denoting that they had their origin in axillary buds after the manner of branches generally; and also, sometimes, by the fact

that they bear imperfect leaves in the form of little scales. The tendrils of the Common or White Bryony (p. 96) are of this nature; while those of the Grape Vine are either modified floral stems or altered flower-stalks.

In some cases the entire leaf may be changed into a tendril, in which instance its true nature is revealed by the presence of a bud in its axil, as in many ordinary foliage leaves. More frequently, however, the 'leaf-tendril' is an altered leaflet of a compound leaf, such as we see in the Peas and Vetches; and it is interesting to note in such cases that the loss entailed by the conversion of leaflets into tendrils is often compensated for by the formation of leaf-like stipules which are capable of performing the function of leaves. In fact, we often find that the size of the stipules is proportional to the number of tendrils produced; and that when the leaflets are considerably reduced in number by their conversion into tendrils, not only are the stipules large and leafy, but the stem itself may be extended laterally into broad wing-like expansions which do the work of foliage leaves.

Interesting illustrations of this are to be found in the Yellow Vetch—a rather rare plant sometimes seen in sandy fields—in which all the leaves are converted entirely into tendrils, and their function performed by very large leafy stipules; also in the Narrow-leaved Everlasting Pea of bushy places, in which the leaflets of the compound leaves are all converted into tendrils with the exception of two, the work of which is aided by the stipules and by the 'wings' of the stem and petioles. In the Rough-podded Vetch, too, the stems and petioles are winged to serve the same end; and other British members of this genus have either

large stipules or winged stems, or both, to compensate for the loss of leaflets that have been modified into tendrils.

In other climbers the blade of the leaf is not reduced in size, even though the leaf serves the purpose of a tendril, the function of clinging being assigned exclusively to the petiole or leaf-stalk. This may be observed in the Wild Clematis and the Bryony, in both of which the petiole forms a ring round any branch or stem with which it comes in contact. These petioles are apparently equally sensitive on all sides, and are therefore ready to cling to any available support, whether above or below. In the Clematis the leaves are at first at right angles to the stem of the plant, but they afterwards turn downwards, and thus transform themselves into so many anchors which give additional aid in supporting the climber among the other hedgerow plants and shrubs.

IV

EARLY SPRING

The work of the botanist is light during the early spring, especially if his attention is directed only to plants and trees in their flowering stages; but, to one whose ambition is to study Nature in all her varied phases, this season of the bursting of the bud, when

all things are awakening into new life, is full of interest, and demands no small amount of time.

The first flowers observed in the spring are mainly those hardy weeds which may be seen in bloom almost through the year, such as the Shepherd's Purse, Chickweed, Groundsel, White Dead Nettle, Red Dead Nettle, and Henbit Dead Nettle. These are soon followed by the Furze, Strawberry-leaved Cinquefoil, Snowdrop, Hazel, Common Whitlow-grass, and other flowers that are truly blossoms of the spring. All these will be described in turn, according to their various habitats; the object of the present short chapter being to note those signs of early spring which demand the attention of the lover of Nature while flowers are as yet few and inconspicuous.

A ramble over bleak downs and moors during the cold days of early spring will probably reveal but little of interest in the way of vegetable life, but in sheltered vales and woods, copses, and protected waysides, there is much to be observed. Here it is that we find the hardy weeds which have continued to bloom throughout the winter months; the earliest of the spring flowers; the fresh green foliage of herbs and shrubs that, in more exposed situations, have been completely denuded; the first tender seedlings appearing above the ground long before the frosts are over; and the expanding 'leaf-buds' showing their green while elsewhere all life seems dormant.

This is the season when the young botanist requires his notebook more than the collecting-book or vasculum; for his records of early flowers, and of the times of the appearance of the leaf in our trees and shrubs, will prove of great interest when compared with the corresponding events and times of other

years. Not only do our spring seasons vary considerably from year to year in such a manner as to alter the general times of appearance of leaf and flower, but the vicissitudes of our climate even change the order in which these events occur.

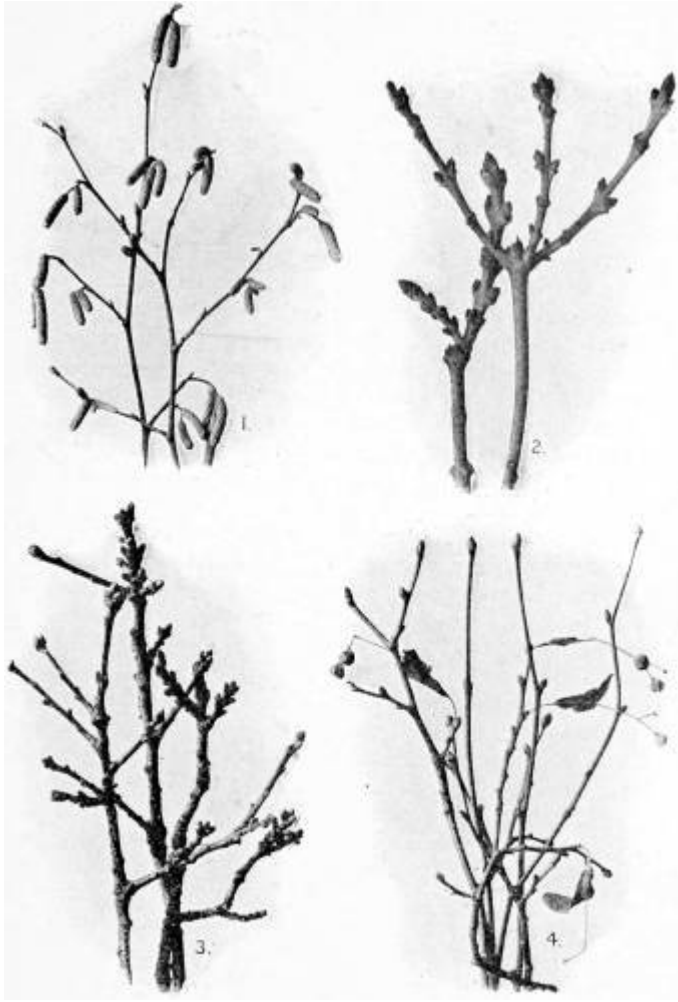
The general study of the buds of trees should commence before they begin to burst. We commonly speak of the buds as winter buds, but it should be known that they were formed in the preceding summer or autumn, and have remained dormant throughout the winter. There is usually a *terminal bud* at the tip of each twig, and *lateral buds* at the sides. If we examine a lateral bud we find immediately beneath it a more or less distinct scar, denoting the position of a leaf that fell in the autumn, thus showing that the bud in question was formed in the axil or angle of the leaf. These observations should be verified by examining the trees in autumn, while the leaves still exist.

It is not sufficient that we are able to recognise trees when in leaf; they should be known equally or almost as well during the winter and early spring while the branches are bare, and this is usually easily accomplished by making ourselves acquainted with the general form of each tree as viewed from a distance, and, on closer inspection, with the nature of the bark and the character of the buds.

All our forest trees are of the exogenous type; that is, their stems increase in thickness by the addition of new wood formed outside the older wood and underneath the bark. Thus the bark, which is composed of a layer or mass of dead, sapless cells, is gradually pushed outward as the stem thickens. The result is that the bark is either more or less fractured, as in the Elm and the Oak, or it flakes off and falls to

the ground, as is the case with the Plane and the Birch. A new layer of bark is always formed during each summer, and this, in turn, either cracks or peels away; but while, in the former instance, the accumulated bark presents a very rugged appearance, and becomes very thick, in the latter case it remains smooth, and is always thin.

Then again, how are we to account for the great variety in the general forms of our different trees—the irregular, crooked nature of the Oak; the slender, but denser branching of the airy Birch; and the tall, pyramidal form of the Lombardy Poplar? All this is easily understood if we carefully observe the positions of the buds as seen during the winter months; and watch the development of these buds during early spring.



TREES IN WINTER OR EARLY SPRING
1. Hazel, with catkins. 2. Ash. 3. Oak. 4. Lime, with remains of the last fruits.

If the buds are irregularly scattered on the twigs, the lateral buds being as strongly developed as the terminal ones, while, in the spring, as is often the case, certain only of the buds develop into new

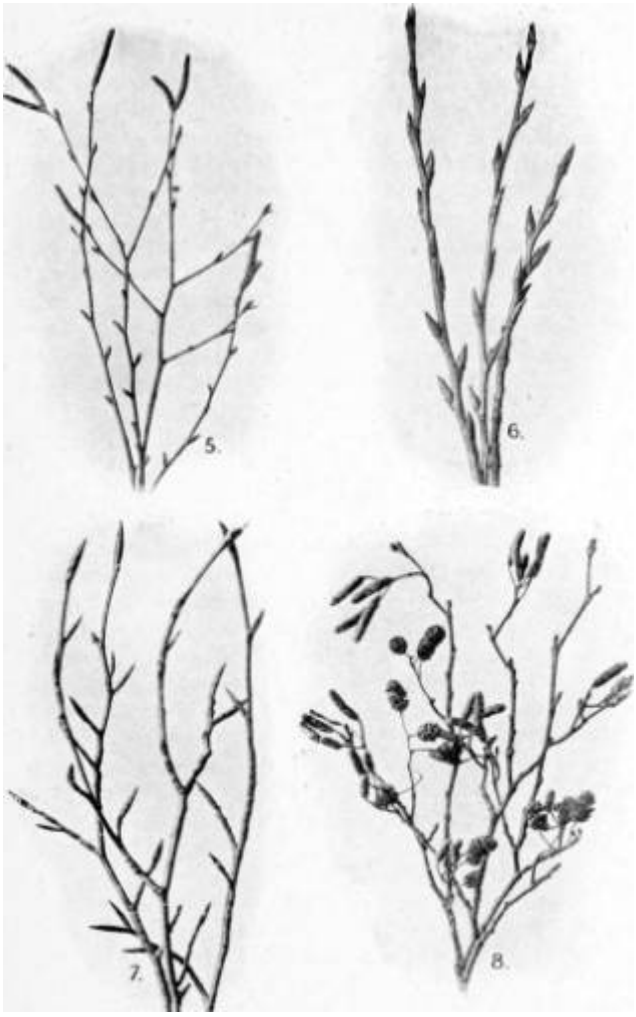
twigs, the others remaining dormant, then the branches assume that irregular, crooked appearance so characteristic of the Oak. If, on the other hand, all the terminal buds are well developed, and the lateral buds are weaker and more regularly distributed, but farther apart, then the tree grows more rapidly in height than in breadth, and assumes more nearly the character of the Pyramidal Poplar. It will thus be seen that the study of trees in their winter condition is not altogether lacking in interest.

Referring once more, but briefly, to the matter of dormant buds, we recommend the reader not only to observe that some buds do not expand with the others during the spring, but to make them the subject of experiment. Thus, when the Horsechestnut is well in leaf, dormant buds will usually be seen on the sides of the twigs, sheltered by the spreading leaves produced at the tips. Now remove the whole cluster of leaves formed by the terminal bud, together with the bud itself, and the hitherto dormant laterals, under the influence of increased light and warmth, and supplied with sap that is now directed into new channels, will speedily show signs of growth. Similarly, the fruit-gardener will remove the tips of the branches of his fruit trees, which often bear buds that are destined to produce leafy twigs only, and thus encourage the growth of the fruiting buds that are situated lower on the twigs.

Let us now briefly consider the structure of buds and the manner in which they are protected. Most buds are surrounded by brownish scales which are impervious to water, and thus prevent a loss by evaporation at a season when the activity of the roots in absorbing moisture from the soil is suspended. Such loss is still further insured in some

cases by a covering of natural varnish. On removing this protective coat we find a dense cluster of closely-packed leaves, variously folded or crumpled in different species, and often, in the centre, a cluster of flowers.

What, then, is the true definition of a bud? It is a young branch, and may give rise to a mature branch bearing foliage leaves only, floral leaves only, or a combination of both. A transverse section of a bud, examined, if necessary, with the aid of the microscope, will show the nature of the branch it was destined to produce; and, in the case of buds which represent, in embryo, branches bearing flowers, or both leaves and flowers, it is often an easy matter to see the whorls of the future flowers, and even the pollen cells in the anthers and the ovules in the ovary.



TREES IN WINTER OR EARLY SPRING
5. Birch, with catkins. 6. Poplar. 7. Beech. 8. Alder, with catkins and the fruit 'cones' of the previous season.

Interesting as it is to study the structure of buds in their dormant condition during winter and early spring, even more fascinating is the watching of the

gradual expansion of the bud and the unfolding of the young leaves. And it is not always necessary to make frequent visits to the woods in order to carry out such observations, for a large number of buds will develop almost equally well, at any rate through their earlier stages, if the twigs bearing them be placed in vessels of water either in or out of doors; and in many cases all the stages from dormant bud to perfect leaves and fully-expanded flowers may be watched in this way.

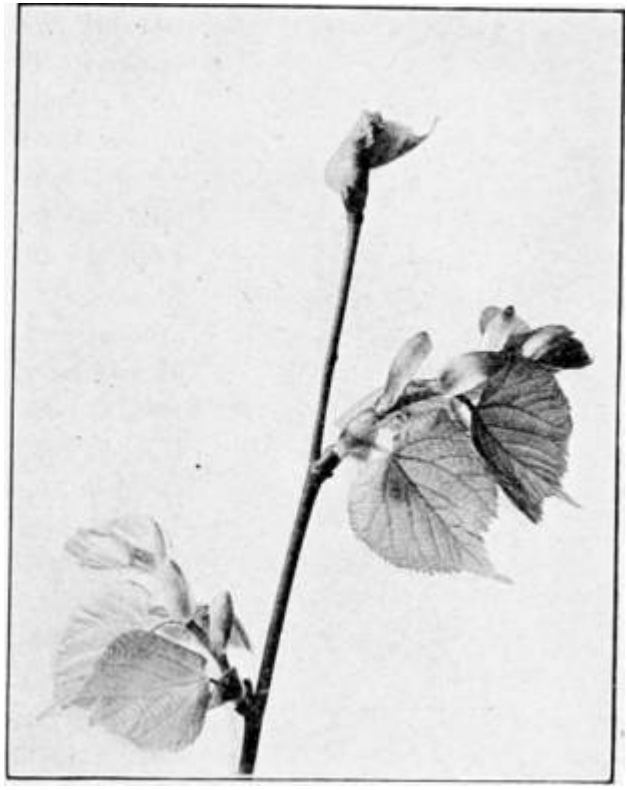
We have spoken of the protection afforded to the dormant bud during the winter period, but it is interesting to note that protection is necessary for the young leaves even after they have forced themselves well out into the light and air. The reason for this is that the epidermis or outer skin of the young leaf is not properly developed. It is not yet water-tight, and, consequently, the sap of the tender leaves would rapidly evaporate, so that they would soon become dry and shrivelled.

The means by which the young leaves are protected will be readily seen if we watch the gradual development of the bud. In many cases these leaves remain folded long after they have left the shelter of the original bud-scales, the manner of folding being the same as that which obtained while within the bud. Sometimes they are folded like a fan, or like the leaves of a book; sometimes rolled one within the other, or irregularly crumpled in such a manner that nothing is exposed to the air except the edges of the leaves and the surfaces of the veins.

In addition to the protection from evaporation afforded by the folding of the young leaves, many are covered with a dense coat of "wool." Young leaves of the Horsechestnut are very thickly covered

with such a coat, of which only the slightest traces are to be seen in the fully-grown leaf. The young leaves of the Beech are folded like a fan for some time after they have left the enclosure of the bud, and the folding is such that the only parts exposed are the margins, the midrib, and the strongly-marked parallel veins. But since all these parts are provided with hairs, the young leaf, as long as it is folded, is surrounded by a complete protective covering. As the epidermis develops, and the danger of loss by evaporation thus reduced, the leaf straightens itself out, and the hairs either fall or become shrivelled. The leaf of the Wayfaring Tree is protected, while young, by a complete covering of starlike hairs which form a fine felted coat over the whole surface; and when the epidermis is properly formed, the hairs are all shed.

Some young leaves are preserved by scaly stipules which surround them after they have emerged from the bud; and as soon as the epidermis is sufficiently impermeable the stipules, having done their work, fall to the ground. So great is the shower of these transient structures, in the case of the Oak, Elm, and Lime trees, that the ground is almost completely covered by them.



TWIG OF THE LIME IN SPRING, SHOWING THE DECIDUOUS, SCALY STI

Young leaves have yet another way of preventing the evaporation of their sap, and that is by turning themselves into the erect position so that the warmth of the spring sun has but little effect on them. The young leaves of various grasses turn their apices upwards; while those of the Horsechestnut, after having lost the protection afforded by the woolly covering and the original folding, turn themselves with their points downwards. Later, when the epidermis is well formed, and the leaves are so far developed that they are capable of utilising the energy of the sun in the performance of their

functions, they take up the horizontal position.

Another interesting matter for spring observation is the relative times of the bursting of the flowering buds and the leafing buds on the same species of tree or shrub. In many cases the former are fully developed before the latter show any signs of active growth, or while the foliage is as yet only passing through its earliest stages. The Hazel catkins shed their abundance of pollen before the foliage buds show the slightest signs of green. The Blackthorn is white with snowy blossoms before a leaf appears. The upper twigs of the Elm appear fluffy in the distance through the formation of its flowers while the foliage buds are still dormant; and the Alder, Willow, Poplar and Aspen likewise produce full-blown catkins while their branches are otherwise bare. Of the trees above named, the Hazel, Elm, Alder, Poplar, and Aspen are dependent on the spring winds for the transfer of the pollen, but the pollination of the Willow and the Blackthorn is brought about by the agency of early insects which visit the flowers for the nectar they provide.



SEEDLING OF THE BEECH, SHOWING THE COTYLEDONS AND THE FIRST FOLIAGE LEAVES.

The same spring sun which calls forth the new leaves and early flowers exerts its vivifying influence on the seeds that fell to the ground before the winter's frosts set in, and in sheltered places myriads of young seedlings of plants and trees may be found in their first stages of growth. The early history of a plant is as interesting a study as that of the mature specimen, and the young botanist will do well if he seeks out the germinating seeds and watches their development. This part of botanical study may, perhaps, be carried on more conveniently at home than in the field, for the seedlings may be grown in soil, wet sawdust, or in water alone, and the stages closely observed.

The seed is a plant in embryo. It consists of a young root, a bud, and one or two seed-leaves or cotyledons. Some seeds contain nothing but the parts just named, and when this is the case the cotyledons contain a reserve of food material sufficient to maintain the developing plant until the root is enabled to absorb sufficient nutriment from the soil, and the first foliage leaves are so far advanced that they can absorb carbonic acid gas from the air, and build up with the aid of this gas, together with the food obtained from the soil, the compounds required by the growing plant.

Other seeds contain, in addition to the embryo, a reserve of nutrient material quite distinct from it; and in such instances the cotyledons have the power of taking up this reserve, changing it to a condition suitable to the requirements of the plant, and then distributing it to the growing parts.

In some seedlings the cotyledons will remain for some time within, or partially within the seed, in order that they may continue the absorption of this reserve; and while this process is going on the seed may remain below the surface of the soil, or it may be lifted into the air by the upward growth of the cotyledons themselves.

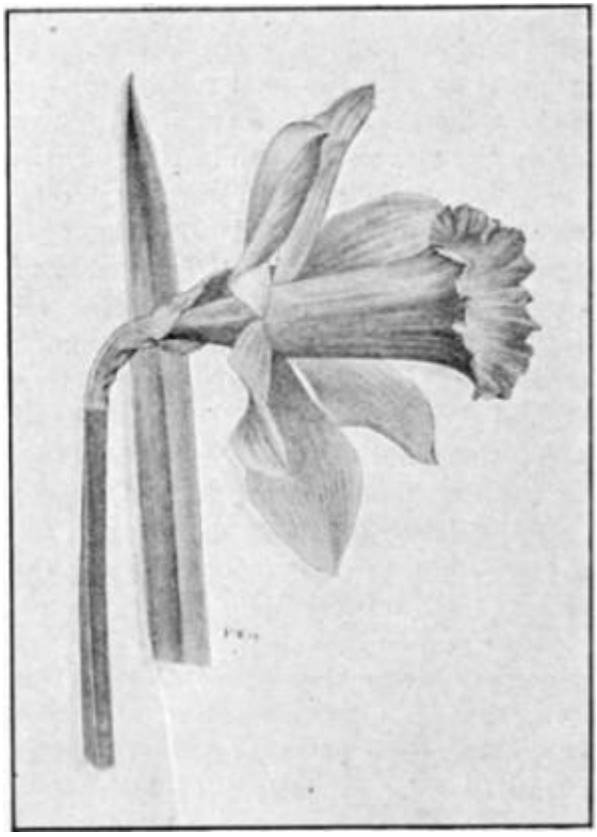
In cases where the cotyledons contain the food reserve for the seedling they sometimes remain under the soil, but in many instances they are pushed into the air by the upward growth of that portion of the plant axis immediately below them. In either case they decay as soon as their work is accomplished. This often happens as soon as they have delivered up to the seedling their reserve of food, but frequently the cotyledons which ascend into the air expand, becoming really leaflike in general appearance, assuming a green colour through the development of chlorophyll (the green colouring matter of plants), and then perform all the functions of the ordinary foliage leaves of the plant. Such cotyledons often continue to exist long after the first foliage leaves have appeared from the bud, for, although the original food reserve has been exhausted, they are now in a position to manufacture, under the combined influence of the sun's warmth and light, compounds essential for their own growth as well as that of the other parts of the seedling. These cotyledons, however, are never of the same form as the true foliage leaves.

The student should obtain a variety of seeds or seedlings of our wild plants and forest trees in order to study these interesting early stages. Such employment will prove very valuable at a season when there is but little call for outdoor work.

V

WOODS AND THICKETS IN SPRING

One of our earliest spring flowers of the wood is the lovely Daffodil or Lent Lily (*Narcissus Pseudo-narcissus*) of the order *Amaryllidaceæ*. This plant develops from a bulb—an underground bud formed of thick, fleshy leaves; and the flowers appear during March and April. The perianth is composed of a tube and six spreading limbs of a delicate yellow colour; and a deep, bell-shaped, golden coronet, beautifully notched and curled at the rim.



THE DAFFODIL.

During April and May we meet with the beautiful little Wood Anemone (*Anemone nemorosa*—order *Ranunculaceæ*), often in such abundance that the ground beneath the trees is completely covered by its graceful leaves and flowers. The leaves are radical, stalked, and deeply lobed, springing from an underground stem. On the flower stalk, some distance below the flower, is a whorl of stalked bracts of the same form as the radical leaves. The flower has six spreading sepals, resembling petals, usually white, but often tinged with a delicate pink,

or, more rarely, with blue. The fruit consists of a number of downy achenes.



THE WOOD ANEMONE

Belonging to the same order (*Ranunculaceæ*) we have two species of Hellebore—the Green Hellebore (*Helleborus viridis*) and the Stinking Hellebore (*H. fœtidus*), both found in woods on chalk or limestone during April and May. The former, also known in parts as the Bear's-foot Plate I, Fig. 1), has leaves palmately lobed, consisting of five or seven parts; and the flowers, which are more than an inch across, have spreading green sepals, and small tubular petals which contain nectar that is supposed to be poisonous on account of the small dead flies that are commonly found sticking to it. The Stinking Hellebore, or Setterwort, has evergreen, radical leaves, the lobes of which do not radiate from a common centre; and the flowers, of which there are

many on each peduncle, have erect sepals.

The Goldilocks or Wood Ranunculus (*Ranunculus auricomus*) is a flower very much like the Upright Meadow Buttercup (p. 211), though not nearly so tall, being only from six to ten inches high. It grows chiefly in thickets and copses, and flowers from April to July. Its root is fibrous; the stem erect, slender, and branched; the radical leaves long-stalked, round or kidney-shaped, divided into three, five, or seven lobes; and the stem leaves few, sessile, and palmately divided to the base into very narrow segments. The calyx is downy, consisting of spreading, yellow sepals; and the petals are often partially or entirely wanting. This plant is widely distributed, but is most frequent in the centre and south of England.

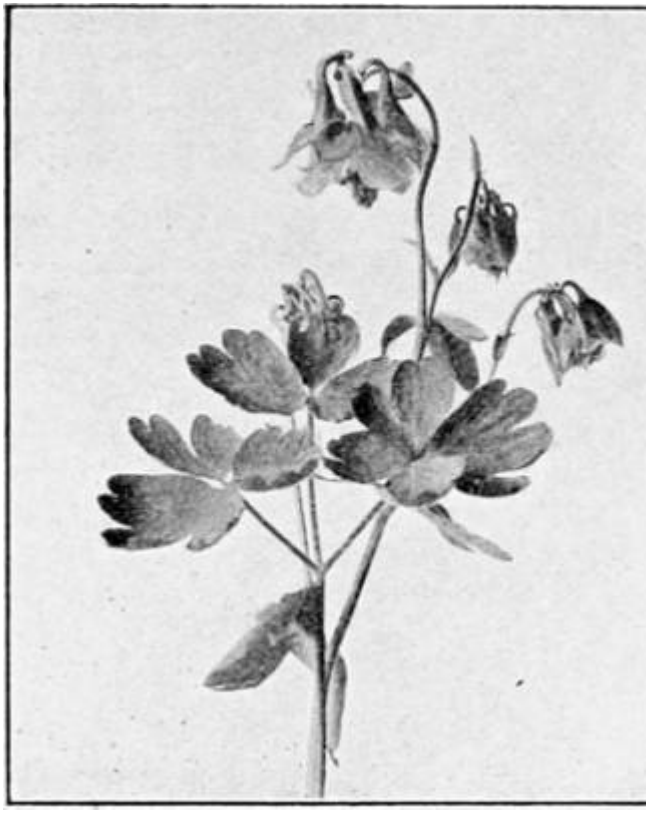


THE GOLDILOCKS

The Columbine (*Aquilegia vulgaris*), also one of the *Ranunculaceæ*, so well known as a garden flower, grows wild in the thickets and copses of several

parts, blooming from May to July. Its branched stem grows to a height of one or two feet; and the leaves are stalked, with three broad, stalked, three-lobed segments. The pretty, drooping flowers are usually over an inch in diameter, of a white, blue, or purple colour, in a loose, leafy panicle. They have five coloured, deciduous sepals; five petals, each with a curved spur that projects below the base of the calyx; numerous stamens; and an ovary of five carpels which ripen into as many follicles.

The Dog Violet (*Viola canina*—Order *Violaceæ*) is probably too well known to need description, seeing that it is easily distinguished from the other species of the same genus by the absence of scent and by the presence of running stems. It is, however, very variable, both in its habits and habitats, so much so, indeed, that some botanists regard the varieties as distinct species under the titles of Wood Violet, Dark Wood Violet, Pale Wood Violet, Hill Violet, Bog Violet, &c. These different forms are distinguished by the shape of the leaves, which may be broadly-cordate, narrow-cordate, or lanceolate; and also by the nature of the stem and the form and colour of the spur of the corolla. In some the main stem is flowerless, but flowering stems proceed from the axils of its leaves; in others the main stem is long and branched, bearing flowers. The narrow-leaved and branched varieties occur principally on heaths, while the broad-leaved forms, in which the main stem is flowerless, are found chiefly in woods. The student will do well to compare as many forms as possible as an interesting study in variation.



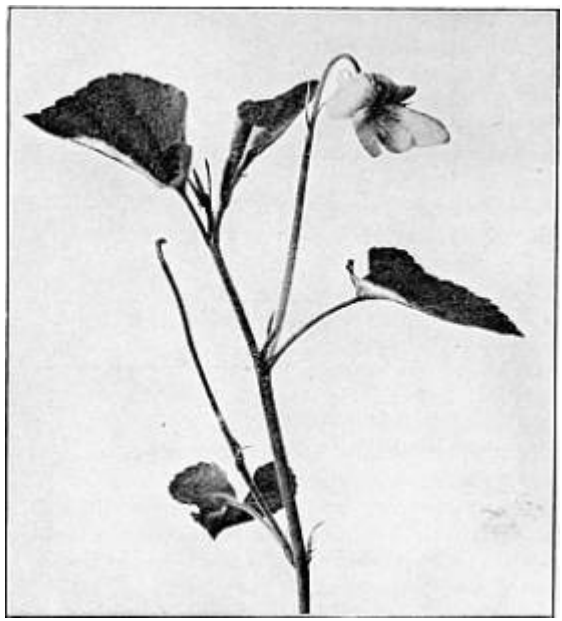
THE WILD COLUMBINE.

The flowers have five sepals; and five unequal petals, usually of a bluish-purple colour, the lower one prolonged backward into a blunt spur. Five stamens closely surround the ovary, which is composed of three carpels, but is one-celled.

The mode of the dispersion of the seeds is particularly interesting in this instance. When the seeds are ripe the ovary splits into three valves which spread out till they are at right angles to their former position. Each valve is closely packed with smooth, oval seeds; and, as the carpels dry, their

sides, originally convex, become gradually straightened so that they press on the seeds. The result is that the seeds are detached from the placenta, one by one, and suddenly shot out to a distance sometimes exceeding a yard. The whole process may be observed by placing some ripe fruits on a large sheet of paper spread in a warm, airy room.

Another peculiarity of the violet is to be seen in its production of two distinct kinds of flowers. The spring flowers, which we know so well, are conspicuous, and are visited and pollinated by insects, but they produce few or no seeds. In the autumn another kind of flower is formed, inconspicuous ones that often possess no petals, and which do not open. These are fertilised by their own pollen, and produce abundance of seed.



The Dog Violet.

Soon after the appearance of the Dog Violet—usually early in May—we meet with the flowers of the Wood Sorrel or Alleluia (*Oxalis Acetosella*), a plant which is often included with the Crane's-bills in the order *Geraniaceæ*, but sometimes placed in a separate small order (*Oxalidaceæ*) containing only three British species. It is a very pretty little plant, of an acid nature, springing from a creeping rhizome. The leaves are radical, ternate, hairy, and sensitive, folding vertically at night in such a manner that the lower surfaces, containing the stomata, are completely covered, and thus loss by evaporation prevented. The flowers are usually solitary and axillary, and the peduncle has two small bracts about half way up. There are five sepals, united below; five white or pinkish petals; and ten stamens, all united into one bundle, but five shorter than the others. The ovary is five-chambered, and the fruit is a capsule.

Like the Violet, this flower is particularly interesting both as to the nature of its flowers, and to the manner in which it scatters its seeds. It bears two kinds of flowers—the delicate spring flowers just described, which are barren; and the later inconspicuous blooms, without petals, and which do not open, but produce seeds. The latter kind of flower may be seen up to August and September.



THE WOOD SORREL.

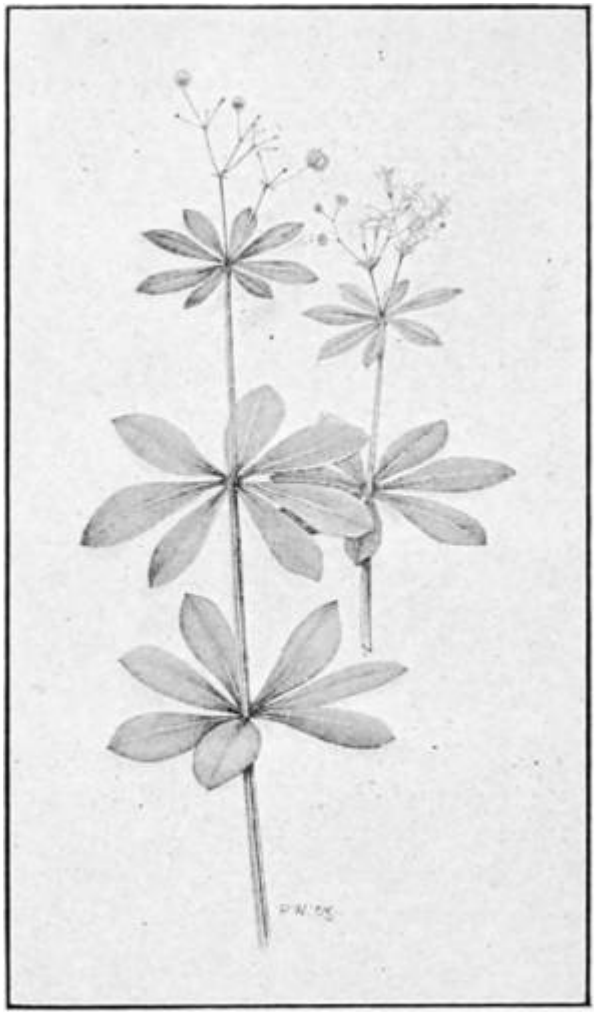
When the ovary is ripe it splits longitudinally along five seams, but the seeds remain attached to the placenta. Now, the seed coat is made up of layers, one of the inner of which becomes highly strained as the ripening proceeds, while the outer coat is not so strained. When the seed is quite ripe the cell-walls of

the deeper layer swell, thus exerting a pressure on the outer layer, which is at last rent. The edges of the slit formed suddenly roll back, and the seed is violently jerked out through the opening of the capsule immediately in front of it.

In April, and from this month to about the end of July, the Wood Strawberry (*Fragaria vesca*—order *Rosaceæ*) is in flower. There is no mistaking this species when in fruit, but at other times the Barren Strawberry (*Potentilla Fragariastrum*), also called the Strawberry-leaved Cinquefoil, is often confused with it. The latter may be known by the absence of runners.

The chief distinguishing features of the Wood Strawberry are the running stem; ternate leaves, with sessile, hairy, serrate leaflets; hairy, erect peduncles; and white flowers, about half an inch in diameter, on pedicels which droop when in fruit.

In shady woods grows the Sweet Woodruff (*Asperula odorata*—order *Rubiaceæ*)—a small, erect and smooth plant, seldom exceeding eight inches in height. The leaves are six to nine in each whorl, lanceolate, with small prickles on the margins. The flowers are white, in terminal panicles, and the fruit is rough with hooked hairs. The herb emits, when dry, a pleasant odour resembling that of new hay.



THE SWEET WOODRUFF.

There are two Periwinkles (order *Apocynaceæ*), both of which have been introduced into Britain as garden flowers, but have become established as wild flowers in several parts. One of these—the Lesser Periwinkle (*Vinca minor*)—is moderately common, especially in the West, where it is often seen in thickets and other

shady places, flowering during April and May. It has a trailing stem, from one to two feet long, rooting at the nodes; and short, erect, leafy, flowering branches. The leaves are opposite, narrow-elliptical, entire, and quite smooth; and the blue or violet flowers, which are about an inch in diameter, are solitary on short, erect stalks. The calyx is free, and deeply divided into five narrow segments; the corolla has a narrow tube, and five broad, spreading parts; there are five stamens, enclosed in the tube of the corolla; and the carpels are distinct at the base, but connected at the top by the single style.

The other species—the Greater Periwinkle (*Vinca major*)—is a very similar plant, but its leaves are broader, with minute hairs on the margin; the calyx segments are also hairy at the edges; and the corolla is larger, with a broad tube.

The Tooth-wort (*Lathræa squamaria*—order *Orobanchaceæ*) is a peculiar, fleshy, pinkish plant, to be found among decaying vegetable matter or at the roots of the Hazel, Elm and a few other trees. It is partly parasitic, deriving its nourishment from the roots of the trees to which it is attached, or sometimes obtaining its food partly or entirely from decaying leaves and stems. Its upright stem, which reaches a height of from five to ten inches, is covered with tooth-like, hollow scales, and bears a one-sided raceme of purple-brown flowers. This peculiar plant is not only a parasite on trees, but is also a carnivorous species, provided with the means of capturing and digesting very small animals, and a more detailed account of its form and habits will be found in our short chapter devoted especially to carnivorous plants.

The Bugle (*Ajuga reptans*, of the order *Labiatæ*), is a

very abundant flower in moist woods and pastures, blooming in May and June. It has a short root-stock, generally with creeping runners; and erect, smooth flowering stems from three to twelve inches high. At the base is a tuft of obovate, radical leaves, from one to two inches long, gradually narrowed into the stalk, with wavy margins; and on the stem are shorter leaves, with very short stalks, the upper ones often deeply tinged with blue or purple. The flowers are blue (occasionally pink or white), and are arranged in whorls of from six to ten in the axils of the upper leaves, the whole forming a leafy spike. They have a five-cleft calyx; a corolla with a short, erect, notched, upper lip; and a longer lower lip with three spreading lobes, the middle one of which is broader and notched.



THE LESSER PERIWINKLE.

The stamens, of which there are two pairs, project beyond the upper lip of the corolla; and the four nutlets of the fruit are rough and united.

The Yellow Dead Nettle, Weasel-snout, or Archangel (*Galeobdolon lutea* or *Lamium Galeobdolon*) of the same order is very much like the White Dead Nettle (p. 102) in habit, but is rather more slender, and less

branched. It is not a very common plant, but is abundant in certain localities, forming one of the conspicuous flowers of thickets, copses and shady hedgerows during May and June. Its leaves are opposite, stalked, ovate, acute, and coarsely toothed; and the handsome large yellow flowers are in dense whorls of from six to ten in the axils of the upper leaves. The calyx has five short teeth; and the corolla has a short tube, not much longer than the calyx, and two lips, the upper of which is arched, while the lower is spotted with red, and has three lobes.

Our next example, the lovely Primrose (*Primula vulgaris* or *P. acaulis*—order *Primulaceæ*), which so beautifully bedecks our woods and banks in April and May, is so well known that a description for purposes of identification is quite unnecessary.

There are two distinct forms of the primrose flower, often called the pin-eyed and the thrum-eyed, the two forms growing on different plants. The former has its stamens at a contracted portion of the tube, about half way down, and a style so long that the stigma is visible at the top of the tube. The latter has its stamens at the contracted throat of the tube, while the style is so short that the stigma is half-way down.



THE BUGLE.

These two forms may be termed the long-styled and the short-styled primrose, respectively, and the difference is of great importance, inasmuch as it helps to bring about the cross-fertilisation of the flower.

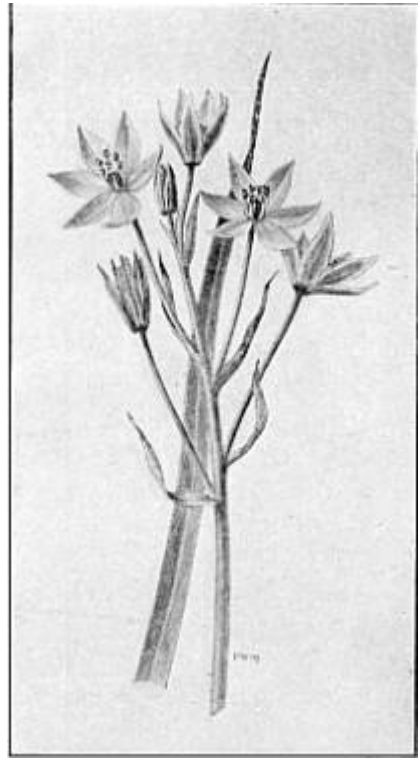


THE BROAD-LEAVED GARLIC.

The principal agents concerned in the transfer of pollen from one flower to another are the wind and insects, but it is evident that the work is done, in the case of the primrose, by insects; for not only do we find that the anthers and the stigma are protected

from the wind, being more or less hidden in the tube of the corolla, but the showy corolla, the delicate scent emitted by the flower, and the nectar produced at the base of the tube all combine to encourage nectar-loving insects whose proboscis is long enough to reach the sweets.

While such an insect is sucking the nectar from a short-styled primrose, the base of its proboscis is rubbing pollen from the anthers at the top of the tube, and the removal of the pollen is assisted by the contracted throat of the corolla in this kind of flower. Should that insect then visit a long-styled flower, the base of the proboscis, now dusted with pollen, will transfer some of the pollen cells to the stigma. In the same way pollen will be transferred from the anthers of the long-styled to the short-styled flower, since the stamens and stigma respectively occupy corresponding positions in the tubes of the corollas.



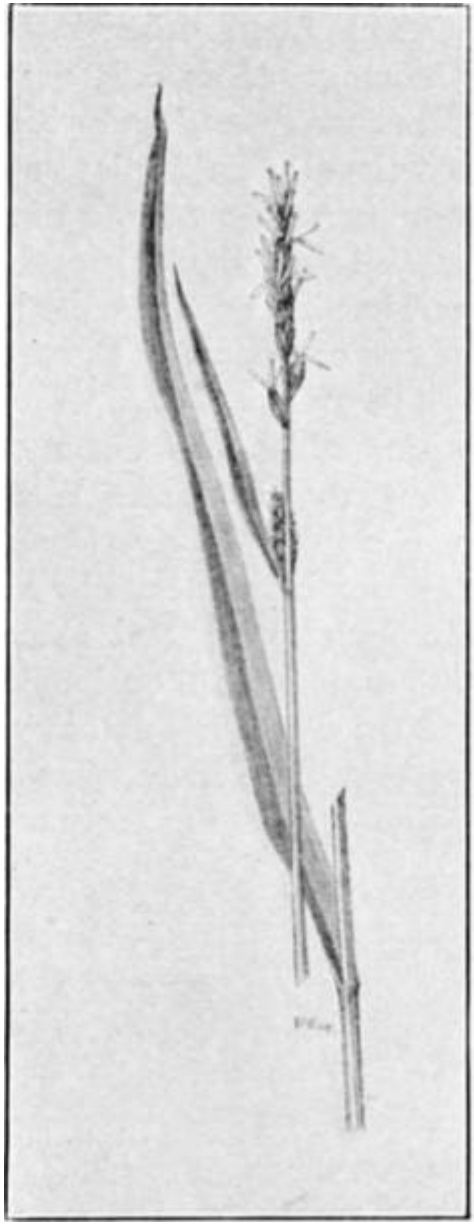
THE STAR OF BETHLEHEM.

On Plate I (Fig. 3) we represent the Lady's Slipper (*Cypripedium Calceolus*)—a rare and beautiful orchis found in some of the limestone woods of North England. Its stem is downy and leafy, reaching a height of about one foot. The leaves, of which there are three or four, are oblong and ribbed; and the one or two large flowers are brownish with the exception of the lip, which is yellow and inflated.

Two species of Garlic (order *Liliaceæ*) are also to be found in woods early in the season. They are both strong-smelling plants with bulbous roots, radical leaves, and flowers arranged in an umbel with

membranous spathes. One—the broad-leaved Garlic or Ramsons (*Allium ursinum*)—is very common, grows to a height of from six to twelve inches, and flowers from April to June. The stem is bluntly triangular and leafless; and the broad, radical leaves are much like those of the Lily of the Valley. The flowers are white, and form a flat umbel with two sharply-pointed bracts at its base.

The second species—the Sand Leek or Sand Garlic (*A. Scorodoprasum*)—grows to two or three feet, and is found almost exclusively in sandy woods of North England, where it flowers a little later than the Ramsons. The stem-leaves are linear, and form two-edged sheaths; and the flowers, which are reddish-purple, are in a loose umbel. (Plate I, Fig. 4.)



THE HAIRY SEDGE.

The Star of Bethlehem (*Ornithogalum umbellatum*) is a pretty flower that was originally introduced for cultivation, but has now become well established as a wild flower in many parts of Britain. It is found chiefly in copses and thickets, especially in the neighbourhood of towns and villages, and flowers in April and May. It has an oval bulb containing an abundance of viscid sap; long narrow, limp, radical leaves; and a flowering stem from six to twelve inches high. The flowers are white, from six to ten in number, arranged in a raceme the lower stalks of which are lengthened in such a manner as to bring all the flowers to a level, thus giving the general appearance of an umbel. There is a membranous bract at the base of each pedicel; and each flower has a perianth of six free, spreading, persistent segments, marked outside with a central, green line, and having a nectary at the base.

The same order includes the well-known Blue-bell or Wild Hyacinth (*Hyacinthus nonscriptus* or *Scilla festalis*), which is occasionally confused with the Harebell of the order *Campanulaceæ*. The leaves of this plant are linear and channelled, and the drooping flowers form a raceme of from six to twelve blooms. The perianth is bell-shaped, composed of six united parts, usually blue, but rarely pink or white. The anthers are yellow, and as with all the plants of this order, the ovary is superior. (See Plate I, Fig. 5.)

In damp woods we often meet with the Hairy Sedge (*Carex hirta*), which grows from one to two feet high; and in similar situations, the Pendulous Wood Sedge (*C. sylvatica*)—a tufted species, with a weak, leafy stem, from two to three feet high, and flaccid leaves. The latter has a single terminal, male spikelet, of about an inch long; and slender, drooping female

spikelets, of about the same length, on long stalks.

On Plate I, we also represent the Wood Melic Grass (*Melica uniflora*), a slender, graceful species which may be seen in woods, often in bloom as early as the beginning of May.

VI

THE SPRING-FLOWERING TREES AND SHRUBS OF WOODS, THICKETS, AND HEDGEROWS

Having considered the principal low-growing flowers of the woods, we must now give some attention to the trees and shrubs of the same localities.

This portion of the field-naturalist's work will be found at least as fascinating as the observation of the herbaceous plants, for although the flowers of trees are often small and very inconspicuous, many are really beautiful blossoms, and all present features of more or less interest to the botanist. Moreover, the observations of these flowers will always be coupled with those of the appearance and expansion of the leaves, for while some trees produce their flowers shortly before their leaves, and others after, leaves and flowers often come about the same time, and the period of the year covered by the present chapter—

from about March to April or early June—will include the bursting of the leaf-buds and the expansion of the leaves of all our deciduous trees and shrubs. Opportunities should be made at this season to observe not only the parts of the trees just named, but to note all other characters presented by the trees, such as the nature of the trunk and its bark, the mode of branching, the appearance of the young twigs, and the nature of the soil and situation in which each species is found.

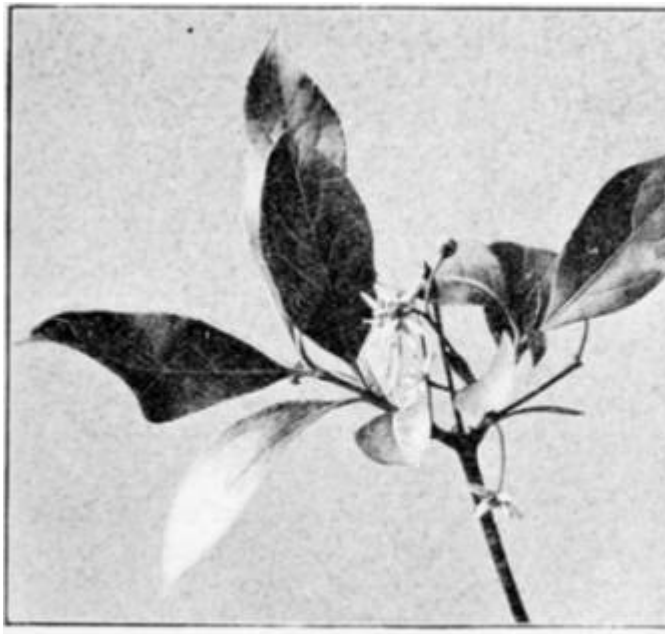
Our first example is the Barberry (*Berberis vulgaris*)—the only British representative of its order (*Berberaceæ*)—a smooth, pale-green shrub, from four to seven feet high, often seen in woods, thickets, and hedgerows, flowering in May and June. Its branches generally droop at the tips, and have triple spines at the base of each leaf or cluster of leaves. The latter are obovate, sharply toothed or even prickly, and often reduced to a cluster of spines. The flowers are pale yellow, in hanging racemes. Each has several yellow sepals, the outer of which are very small; six petals, in two whorls, with nectaries at their bases; and six stamens. The stamens at first lie on the petals; but they are very sensitive, and when the filaments are touched by an insect as it seeks the nectar at their bases, the stamens immediately spring upward, throwing off their pollen, and often depositing some on the insect's back. It is thus possible that the cross-pollination of the flowers is greatly aided by the insect, especially as it will often happen that the same part of its back which has been touched by the elastic stamen will come in contact with the stigma of another flower.



THE BARBERRY.

The Sycamore, also called the Great Maple and the False Plane (*Acer pseudo-platanus*—order *Aceraceæ*), although not really a British tree, has probably found a home here for nearly five centuries. It has been named the False Plane on account of its having been mistaken for, and called, the Plane, which tree it somewhat resembles in the form of the leaf, as well as in the character of the smooth, thin bark that peels off, giving the tree a patchy appearance. It

should be noted, however, that the leaves of the Plane are arranged alternately, while those of the Sycamore are in opposite pairs; also that the fruits of the former are in pendulous balls while those of the latter are winged, and generally in two parts.



THE SPINDLE TREE.

The Sycamore grows to a height of from forty to fifty feet and flowers in May or early June, some time after the appearance of the leaves. The leaves are simple and cut into five lobes, with a palmate venation and irregularly toothed margins. The flowers are small, yellowish green, and produced in graceful, pendulous racemes. Each one is about a quarter of an inch in diameter, with five narrow sepals, five narrower petals, eight stamens, and a two-lobed, flattened, hairy ovary which develops

into a pair of 'keys' or samaras, with wings about an inch and a half long.

The Maple (*Acer campestre*) is a much smaller tree, with a very rugged, corky bark. In woods it often reaches a height of fifteen to twenty feet, though it produces flowers and fruit long before it is fully grown; and it is often seen, more or less trimmed and stunted, among hedgerow shrubs. Its leaves are opposite, two to four inches wide, on slender stalks, palmately veined, and divided to about the middle into five obtuse, entire or crenate lobes. The greenish flowers are much like those of the Sycamore, and appear at the same time, but grow in loose, erect, axillary racemes; and the wings of the fruit always spread horizontally in a straight line. On p. 337 is a photograph of a twig of this tree in fruit.

The Spindle Tree (*Euonymus europæus*), the only British member of the order *Celastraceæ*, is a moderately common wood and hedgerow shrub which is usually from four to ten feet high, when untrimmed, bearing yellowish-green flowers during May and June. Its branches are smooth, green and angular; and its leaves are opposite, shortly-stalked, oval, acute, finely toothed, with a shining surface. The flowers are usually from three to five together in loose axillary clusters. They have a small, flat calyx of four short sepals; four spreading petals, about a sixth of an inch long; four stamens, about half the length of the petals; and an ovary of from three to five cells embedded in the fleshy disc. The fruits are very pretty, and often form a conspicuous feature of the hedgerow during late summer. They are lobed capsules which open at the angles, exposing the bright orange mace that encloses the seeds.

Several of the prettiest of our trees and shrubs belong

to the order *Rosaceæ*, and among these we may name the Dwarf Cherry, Bird Cherry, Gean, Sloe, Bullace, Hawthorn, Wild Pear, Crab Apple, Service Tree, White Beam Tree, and Mountain Ash. The first of these, known variously as the Wild Cherry, Dwarf Cherry, and Red Cherry (*Prunus Cerasus*), grows from four to eight feet high, and bears white flowers, in almost sessile umbels, during May and early June. Its bark is of a reddish colour, and numerous suckers arise from its root. The leaves are oval-oblong, smooth, firm, and nearly erect; and the fruit is round, juicy, and red. Although in the wild state the fruit is very acid, this is the tree from which our sweet, cultivated cherries have been derived. In order to distinguish this from other similar species, it should be noted that the tube of the calyx is *not* contracted at its mouth.

The Bird Cherry (*P. Padus*) is found principally in North England, where it is moderately common in parts. It is larger than the last, often reaching a height of fifteen feet. Its leaves are narrow, somewhat egg-shaped, smooth, with a doubly-serrate margin. The flowers, which appear in May or June, are white, and arranged in pendulous racemes; and the fruit is oval, almost black, and bitter.



THE WILD CHERRY.

Another wild cherry, generally known as the Gean (*P. Avium*), is still larger, sometimes reaching a height of thirty feet, and is not uncommon in woods and hedges. The bark is smooth; the leaves abruptly pointed, soft, drooping, and downy beneath; and the beautiful white flowers are in almost sessile umbels. The calyx-tube of this species is contracted at the mouth, and the fruit is either red or black, heart-shaped, and bitter. The leaves turn to a deep red colour in the autumn.

Among the earliest flowers of Spring are the white blossoms of the Sloe or Blackthorn (*Prunus spinosa*), which appear in March and April, some time before

the leaves. The shrub grows from four to eight feet high, has a blackish bark, and numerous branches, the smallest of which terminate in hard, rigid thorns. The leaves are ovate, finely-toothed, smooth, stalked, with small, free stipules. The flowers are small, shortly-stalked, with a free, deciduous calyx of five lobes; five spreading petals; from fifteen to twenty stamens; and an ovary which ripens to an almost black, juicy, acrid drupe, about half an inch in diameter, containing a hard stone, and covered with a bluish bloom. This shrub is very common in thickets and hedgerows.

The Bullace (*Prunus insititia*), sometimes regarded as a variety of *P. spinosa*, is a very similar bush, growing in similar situations, and flowering at the same time; but its bark is brown, and the branches less spiny. Its leaves, also, are downy beneath; and the flowers, which appear at the same time as the leaves, are in pairs, on downy stalks. The fruit is about double the size of that of the last species, either dark or yellow in colour, less acrid, and drooping.

The above two species are the origins of the damsons and plums of our fruit gardens.

The May or Hawthorn (*Cratægus Oxyacantha*) is so well known that there would be no necessity to describe it, were it not for the fact that, being so familiar, its distinguishing characters are liable to be overlooked. It is a much-branched shrub, with many of the branches modified into protective spines. The leaves are simple, smooth, deeply-lobed and obtuse, have deciduous stipules, and appear before the flowers. The flowers are generally white, sweetly-scented, and arranged in corymbs. There are five sepals and five petals, and the numerous stamens

have pink anthers producing brown pollen. The carpels, one to three in number, are enclosed in the calyx-tube; and the fruit is a bright red pome with a bony core.

The Wild Pear (*Pyrus communis*) is occasionally met with in woods and hedgerows, where its white flowers may be seen in April or May. The leaves of this tree are simple, elliptical, and serrate; and the smaller branches often terminate in a spine. The flowers are about an inch in diameter, and arranged in corymbs. They have distinct styles—a feature which serves to distinguish the blossom from that of the Wild Apple; and the fruit, which tapers towards the base, is a five-chambered, woody pome, with a horny core. Two varieties of this species occur, one with the base of the fruit conical, and the other with the base rounded.

The Crab Apple (*P. Malus*) is very similar in general appearance, but has no spines; and the flowers, which are in sessile umbels, are white, with delicate shades of pink. The styles, also, are united below; and the fruit is globular, yellow or reddish, concave at the insertion of the stalk, very acid, and five-chambered. This tree is common in hedgerows as well as in woods, and flowers during May or early June.



THE CRAB APPLE.

In the woods and hedges of South England we commonly meet with the Service Tree (*P. torminalis*)—a small tree with downy twigs, and smooth leaves with from six to ten triangular, serrate lobes. Its flowers are small, white, and arranged in compound cymes. They bloom in April and May; and in the autumn their place is occupied by small, green fruits, spotted with brown, with a two-chambered, brittle core.

The White Beam (*P. aria*) is a small tree, commonly

found on the outskirts of woods on chalky or limestone soils, which might be confused with the last species. It has large, irregularly-lobed leaves, white and downy beneath, with serrate edges. The general form of the leaf is egg-shaped, while that of the Service Tree is cordate. The corymbs of white flowers bloom in April; and the fruit, though much like that of *P. torminalis*, is spotted with *red*. There are no less than four varieties of this tree, distinguished mainly by the forms of the leaves, the serration of their edges, and the number of lateral veins.



THE MOUNTAIN ASH.

We have yet another representative of the Rose order in the Mountain Ash, Rowan, or Fowler's Service

Tree (*P. Aucuparia*), which is common in mountainous woods, and supplies an edible fruit. It is a very graceful and beautiful tree, with a smooth greyish bark; and pinnate leaves with from thirteen to seventeen serrate leaflets, downy on the under side. The flowers are small, of a creamy white colour, in large corymbs. They bloom in May and June; and later in the year their place is occupied by the scarlet globular fruits, with a yellow pulp, enclosing from two to four chambers.

The Black Currant (*Ribes nigrum*), of the order *Grossulariaceæ*, or sometimes included in the *Saxifragaceæ*, is sometimes found wild in moist woods, flowering in April or May. It is well known as a garden shrub, and may be easily recognised by the characteristic odour emitted from its stems and leaves when bruised. In some northern woods the Red Currant (*R. rubrum*) is also found wild.

The Wayfaring Tree or Mealy Guelder Rose (*Viburnum Lantana*—order *Caprifoliaceæ*) is moderately common in the woods and hedges of dry districts, especially on calcareous soils. It grows from ten to twenty feet high, and flowers during May and June. Its young shoots are covered with star-like hairs, which give them a characteristic mealy or downy appearance. The leaves are simple, elliptical-cordate, serrate, without stipules, and are downy beneath. The flowers are small, white, perfect, and arranged in terminal cymes. In late summer the tree is rendered conspicuous by its *flattened* berries, which become scarlet as they ripen and afterwards turn black. A photograph of a twig in fruit is given on p. 338.

The Ash Tree (*Fraxinus excelsior*—order *Oleaceæ*) is easily recognised at a distance, either in summer or

winter, by the graceful curves of the lower branches, which droop, and then bend upward at their extremities; also, on a closer inspection, by the light ashy colour of the smooth bark of the twigs, and the large, black, triangular, terminal buds. The leaves are pinnate, with from nine to seventeen oblong-lanceolate, sessile, serrate leaflets. The flowers appear before the leaves in April and May, in dense clusters. They have no perianth: some consist only of an ovary, some only of two dark purple stamens, while others are perfect flowers with both ovary and stamens. Some trees have male blossoms only, and therefore produce no fruit; others bear dense tufts of pendulous, winged fruits which are ripe in October (p. 336), but often remain on the tree till the following spring. The wing of the fruit is slightly twisted, and thus, when the fruit is detached, it falls with a slow, spinning motion that allows it to be carried some distance by the wind, reaching the ground with its seed-end downwards. The seed does not germinate until the second spring. A variety of the Ash occurs with simple leaves.

Very early in the Spring—February to April—we may often see the Spurge Laurel (*Daphne Laureola*) in flower in woods and copses. This is an erect, smooth shrub, from two to four feet high, with a few erect branches bearing at their summits crowded clusters of thick, glossy, narrow, evergreen leaves. Its flowers, of a yellowish green colour, are in drooping, axillary clusters among the leaves. They have a tubular, inferior perianth, with four spreading lobes; eight stamens inserted in the top of the tube; and a free ovary of one cell, containing a single ovule. The perianth falls early; and the ovary afterwards becomes a berry-like fruit with a single stone.



THE SPURGE LAUREL.

Another similar shrub, known as the Mezereon (*Daphne Mezereum*), is found in similar situations, and flowers at the same time, but it may be known by its deciduous leaves, and by its pale red flowers arranged in threes on the side of the stem. These two species are the only British representatives of the order *Thymelaceæ*.

Two species of Elm are common in our woods and hedgerows. The small-leaved or Common Elm (*Ulmus campestris*), and the Wych Elm (*U. montana*). Both are distinguished by their thick, furrowed, corky bark; and their rough oval-cordate leaves with unequal sides. They are often placed in the same order

(*Urticaceæ*) as the well-known Stinging Nettles, but some authorities form a distinct order for these two species alone, under the name of *Ulmaceæ*.

The Common Elm is not indigenous, but was introduced into our country by the Romans. It is, however, one of our commonest trees, and is especially abundant in the South. The midrib of the leaf is covered below with irritating, glandular hairs, somewhat resembling those of nettles in structure and function; and the stipules are deciduous, falling early in the season. The flowers are perfect, appearing before the leaves in March and April, and are in small, dense clusters, principally on the topmost branches. Each flower has a little, bell-shaped, persistent perianth; a superior ovary with two styles; and four or five stamens with black anthers. The fruits are very thin oval samaras with the seeds above the centre, but they seldom ripen in our country. They are produced in such abundance that the ground is often almost completely covered with them when they fall. Botanists recognise several varieties of this species, but these differ so slightly from one another that they are barely distinguishable. The Common Elm throws off a large number of suckers from its roots, often producing a dense undergrowth round its bole.



THE ELM IN FLOWER.

The Wych Elm is a native of our country, and is also very common, but it occurs principally in the woods of the North. It is very similar in general appearance to the last species, which it also resembles in having several barely distinguishable varieties; but it generally attains a much greater girth, and does not throw off such an abundance of suckers from its roots. Its twigs are downy; and the leaves, which are larger than those of *U. campestris*, are irregularly doubly serrate, with hairs on the prominent ribs of

the under side, and are arranged in two straight rows, one on each side of the twig. The flowers are very similar to those of the Common Elm; and the fruit is a broad oblong or almost round samara, with the seed in the *centre*. Both species are pollinated by the wind; and, as is the case with wind-pollinated flowers generally, the stamens protrude well out of the flower, and produce abundance of pollen.



THE OAK IN FLOWER.

Four of our forest trees belong to the order *Cupuliferæ*; these are the Oak, Beech, Hornbeam and Hazel. The first of them—the Oak (*Quercus Robur*)—is easily recognised in the winter by its deeply-

furrowed, corky bark, its zigzag, spreading branches, and the clusters of oval buds at the tips of the twigs. In summer it may be known at once by the oval, sinuate leaves with blunt lobes. The flowers of the Oak appear with the leaves in April or May; they are imperfect, but both male and female blossoms appear on the same tree. The former are in slender, drooping, interrupted catkins; and each flower has ten stamens. The latter are in clusters of a few only, and each separate flower is enclosed in a cupule of overlapping scales. The ovary has three cells, and contains six ovules; but, as a rule, only one ovule of each flower is fertilised. Sometimes, however, two, three, or more of the ovules become fertilised, thus producing an acorn which will give rise to as many separate seedling trees. At times we meet with an Oak nearly every acorn of which contains two or more ovules. This tree is remarkable for the number of insects which feed on its leaves, and also for the number of different species of gall-flies which produce galls on its leaves and stems. Two well-marked varieties occur: one—*pedunculata*—with sessile leaves and long flower stalks; and the other—*sessiliflora*—with stalked leaves and short flower-stalks.



THE BEECH IN FRUIT.

The Beech (*Fagus sylvatica*) is readily recognised during winter and early spring by its smooth, thin, olive-grey bark, and its long tapering, pointed, brown buds. The expanding buds have already been mentioned (p. 44) as of special interest as regards the fan-like folding of the young leaves, and the arrangement for preventing undue loss of moisture while the epidermis is as yet very thin and permeable. The leaves of this tree are ovate, smooth and glossy, with strongly-marked parallel veins branching from the midrib. When young they are

very silky, but later the fine, silky hairs are seen only on the slightly-toothed margin, and even these disappear as the season advances. The flowers are imperfect, and appear in April or early May. The staminate catkins are of a dark purple-brown colour, rounded and pendulous, with from eight to forty slender stamens having exposed, yellow anthers. The pistillate flowers are grouped in little clusters of from two to four, each one having three stigmas, and being surrounded by a four-lobed prickly cupule which afterwards forms a closed case. The fruits are three-cornered nuts, enclosed in the hardened cupules which split longitudinally, when ripe, into four valves that are lined with soft, silky hairs.

The Hornbeam (*Carpinus Betulus*) is a much smaller tree, more or less abundant in the damp, clayey woods of the South. Its bark is smooth or slightly furrowed, of a light greyish colour, and its leaves are elliptical-ovate, with a doubly-serrate margin and acute point. The arrangement of the principal veins is the same as that of the Beech, and the young leaves are similarly plaited in the bud, but the expanded leaves are broader at the base than those of the Beech, are rougher, and are permanently hairy on the under surface. As with the Beech, the leaves assume very pleasing tints in the autumn, turning first yellow, and then through shades of orange to brown; and, in sheltered woods, many of them remain on the tree throughout the winter. The flowers appear in May and early June, and are imperfect, male and female flowers being in separate catkins, but on the same tree. The staminate catkins are pendulous and leafy, each flower having oval, acute bracts, and from three to twelve stamens with forked filaments and hairy anthers. The pistillate flowers are in erect catkins and are arranged in pairs.

Their outer bracts are shed early, but the inner bracts or *bracteoles*, which are three-lobed, grow very large as the fruits ripen, at which time, also, the whole catkin becomes pendulous. Each flower has a two-chambered ovary, and two styles; but only one cell develops, and thus the fruits, each with only one seed, lie on the bases of the leafy bracteoles which aid in their dispersion by the wind.

Our last example of the *Cupuliferæ* is the well-known Hazel (*Corylus Avellana*), which is generally found in trimmed hedges and among the undergrowth of woods. Its bark on the trunk and larger branches is grey; but brown, hairy, and dotted with glands, on the young shoots. The leaves are roundish, slightly cordate and unsymmetrical, with a sharp apex and an irregularly-serrate edge; and, when young, are longitudinally plaited in the bud. The flowers appear before the leaves, and are mature in March or early April, but the early stages of the catkins may be observed on the tree throughout the winter, and even in the preceding autumn. The staminate catkins are pendulous, from one to two inches in length when in full bloom, and are commonly known to country children as 'lambs-tails.' They are of a bright yellow colour, and each flower has from four to eight stamens, with hairy anthers that produce abundance of pollen. The pistillate catkins are small, oval, and sessile, hardly to be distinguished from the foliage buds until they protrude their bright crimson stigmas. The minute flowers are enclosed in overlapping bracts which afterwards form the leafy cupules of the large woody nuts; and each one has a two-celled ovary and two styles.

Our forest trees include three representatives of the order *Betulaceæ*—the Common Birch, the Dwarf

Birch, and the Alder. The first of these, the Common Birch, Silver Birch, or Lady of the Woods (*Betula alba*), is at once recognised by its smooth, silver-white bark, which peels off in horizontal strips; its copper-brown branches; and its very slender, drooping twigs. The leaves are small, rhomboid or triangular, with an irregularly doubly-serrate margin, a sharp apex, and veins very prominent on the under side. They are also provided with long stalks which, together with the slender character of the weeping twigs, allow them to be moved by the slightest breeze. The male and female flowers are in separate catkins, the former of which may be seen on the tree throughout the winter, but do not bloom until April or May. Both are at first erect, but the staminate catkins droop as they mature, and shed abundance of yellow pollen. The flowers have three-lobed, deciduous, scale-like bracts; the male ones consist of two stamens with forked filaments; and the females of a flattened, two-celled ovary. The female catkins droop as they ripen, each one producing a large number of minute, one-seeded and broadly-winged fruits which are easily dispersed by the wind. Two varieties of this tree occur, one with the leaves and twigs covered with downy hairs, and the other with leaves of an oval-cordate form.

The Dwarf Birch (*B. nana*) is a mere shrub, seldom exceeding two feet in height, and is to be found only in some of the mountainous districts of Scotland. It has rounded, crenate leaves, with short stalks; and the wings of the fruit are very narrow.

The Alder (*Alnus glutinosa*) is common in wet woods, and especially along the banks of streams in wooded valleys. Some of the mountain streams of the West of England, Wales, and Scotland, are bordered with

almost continuous lines of Alder for miles together. This tree has a very dark grey bark, and the young branches are more or less triangular in form. The leaves are round, with a wedge-shaped base, and are green on both sides. They have very short stalks, are very blunt, and have a wavy, serrate margin. When very young they are hairy and sticky to the touch; hence the specific name of *glutinosa*. The catkins appear before the leaves, and are mature in March or April. The staminate catkins are pendulous, and much like those of the Birch; but the flowers have red scales and four stamens. The pistillate catkins are short and erect, and each flower has a fleshy scale within a reddish-brown, woody bract. The fruits are shed in the autumn, but the thickened woody bracts of the female catkin remain on the tree till, and even after, the flowers of the following spring are in bloom.

Coming now to the order *Salicaceæ*, we have to deal with the Poplars, of which we have several species, all more or less common, and largely planted in cultivated ground. Our first example is the White Poplar (*Populus alba*), a large tree frequently seen in abundance in most woods. It has a smooth, grey bark, spreading branches, downy shoots and buds, and it throws off many suckers from its roots. The leaves are roundish, approaching a heart-shape, except those of the young shoots, which are divided more or less deeply into five lobes; and they are covered below by a white cottony down. The flowers are imperfect, and the male and female catkins, produced on different trees, are mature in March or April. The male catkins are three or four inches long, and each flower has from six to ten stamens, with red anthers. The female catkins are much shorter, and its flowers have divided stigmas, with long,

narrow, yellow segments arranged like a cross. The ovaries ripen into capsules which split open in July, setting free seeds which are provided with cottony filaments; and the seeds often fall in such abundance as to almost completely cover the ground beneath the tree.

The Grey Poplar (*P. canescens*) grows in similar situations, and flowers at the same time. Its leaves are roundish, with a waved and toothed margin, and are covered beneath with a slight coating of grey down. Those of the youngest shoots are more or less lobed. In this species the two stigmas are purple, wedge-shaped, and divided into from two to four lobes.

A third species—the Aspen (*P. tremula*) receives its specific name from the tremulous movements of its leaves, which swing with a rotary movement when disturbed even by the slightest breeze. This characteristic is common, to a greater or lesser degree, to all the species of this genus, and is due to the peculiar nature of the leafstalks, which are long, and flattened in a plane at right angles to that of the blade of the leaf. The Aspen has a grey bark, spreading branches, and downy shoots. The leaves are nearly round, with a sharp point and a serrate margin. When young they are downy above and beneath, but become smooth later. The catkins are very dense, and the flowers of the female tree have two divided stigmas.

The Black Poplar (*P. nigra*) and the Lombardy Poplar (*P. fastigiata*), though very common, are not natives of this country. The former is a large, spreading tree, and the latter is readily distinguished by its tall, pyramidal form, with all its branches directed upward. Although these two trees are so very unlike

in general appearance, yet they resemble one another so closely in the form of the leaves and the character of the flowers that they are sometimes regarded as two varieties of the same species. In both the leaves are very variable in form, being either triangular, rhombic, or nearly circular, with rounded teeth. Both have smooth shoots, and sticky buds; and their catkins are not so dense as in the other members of the genus. The leaves also are smooth on both surfaces except when young, at which stage they are slightly downy beneath. The male catkins are two or three inches long, of a deep red colour; and, since they appear before the leaves, are very conspicuous. The female catkins are much shorter and erect, and the ripe capsular fruits burst in June, setting free seeds which are covered with a cottony down. *P. nigra* has a furrowed grey bark, rendered still more irregular by prominent swellings, and it rarely produces suckers. *P. fastigiata*, on the other hand, often produces numerous suckers, and its trunk generally has a rough, furrowed, and twisted appearance. It is interesting to note that the female of the latter does not occur in our country. The tree was introduced by means of suckers, and it appears certain that suckers of the male tree only were brought over for this purpose.

We conclude this chapter by a brief description of the two native conifers of our woods—the Scotch Fir or Scots Pine (*Pinus sylvestris*) and the Yew (*Taxus baccata*). The former is very well known, for while its real home is the elevated parts of the North, it has been planted more or less in most southern districts; and it is readily distinguished from other forest trees by its general form, as well as by the nature of its leaves, and by its 'cones.' It should be noted, however, that several similar species, which may be

confused with the Scots Pine, have been introduced into our country, but descriptions of these can hardly be included here.



THE SCOTS PINE WITH THE CONES OF TWO SEASONS.

The bark of the Scots Pine is rough, of a reddish-brown colour, and peels off in thick scales. Its trunk reaches a diameter of three or four feet, and it often grows to a height of over one hundred feet. The leaves are long, slender, rigid, grooved above, and always arranged in pairs. When young they are of a bright green colour, but turn to a dark green later, and remain on the tree for two years or more. The male and female flowers grow on the same tree, and are mature in May or June. The male catkins are

only about a quarter of an inch in diameter, but are collected into conspicuous spikes, and shed an abundance of pale yellow pollen. The female catkins are in the form of egg-shaped cones, tapering to a point. The carpels of the flowers do not enclose the seeds, but are thick scales beneath which the seeds lie. The cone is two or three inches in length, and takes about eighteen months to ripen, so that the cones of two successive years will generally be found on the tree at the same time. When ripe, the scales are woody and very hard, and as they separate, the winged, naked seeds are set free and dispersed by the wind. The tree has usually a very weather-beaten appearance, due to the fact that the lower branches die as the height increases, and are then more easily detached in stormy weather.



THE YEW IN FRUIT

The Yew is a native of mountainous woods, but has been planted largely in other situations. It is an evergreen tree, with a dark brown, fibrous bark; and although it never grows to any great height—seldom exceeding fifty feet, it often has a girth of from twenty to thirty feet, and reaches an age of fifteen hundred or two thousand years. The leaves are very crowded, about one inch in length, and arranged in two rows along the stem. They are linear, pointed, of a dark glossy green above, and lighter below. The flowers are small, sessile, situated in the axils of the leaves, and appear in March or April. The male flower consists of from five to eight anthers, below which is a whorl of overlapping scales. The female is much smaller, and is composed of a fleshy disc with a small ovule at the top and scales below. After fertilisation the ovule enlarges into a green seed, and the disc, which almost completely surrounds it, develops into a roundish, sweet, fleshy cup, about half an inch in diameter, of a bright rose-red colour and of a beautiful waxy appearance. The leaves of the Yew are poisonous, but the fruits are quite harmless. A variety of this tree occurs of a pyramidal form, with scattered leaves and an oblong fruit. It should be noted that while the male and female flowers of the Yew generally grow on separate trees, the both are occasionally found on the same tree.

VII

WAYSIDES AND WASTES IN SPRING

In the present chapter we shall consider a number of wild flowers that are to be found by the waysides, including banks and hedgerows, and in waste places, during the spring months.

Our first example is the Celandine (*Chelidonium majus*), of the Poppy family (order *Papaveraceæ*), generally spoken of as the *Greater* Celandine in order to distinguish it from the Lesser Celandine (p. 108), which belongs to the *Ranunculaceæ*. This plant is moderately common in shady hedgerows and waste places, grows to a height of from one to two feet, and flowers from May to July or August. It has a yellow, pungent, poisonous sap. The leaves are pinnate, with an odd leaflet at the tip, of a glaucous green colour; and all the leaflets are bluntly lobed. The flowers are yellow, from three-quarters to an inch in diameter, and are arranged in long-stalked umbels. As in the poppies, there are two sepals which fall early, and four petals which are crumpled in the bud. There are numerous stamens, attached below the superior ovary; and the latter ripens into a pod-like capsule of one chamber, about an inch and a half in length, which splits, when ripe, into two valves.



THE SHEPHERD'S PURSE

The Order *Cruciferæ* is well represented by the wayside and on waste ground during the spring months, and the reader will do well to note the general characters of the flowers of this order (p. 17), unless already acquainted with them, before attempting to identify the species here described.

Our first example—the Shepherd's Purse (*Capsella Bursa-pastoris*) is a well-known weed, often troublesome in our gardens, and may be seen in bloom from February to October. It is an erect herb, from six to eighteen inches high, which may be identified at once by reference to our illustration. The small white flowers are in lengthening racemes, and are often made less conspicuous by the conversion of the four petals into stamens. This weed is easily distinguished from all the other plants of the order by the form of the fruit, which is triangular and inversely heart-shaped. When ripe, it splits into two boat-shaped, keeled valves, which separate from a central membrane to which the seeds are attached.

The Common Scurvy Grass (*Cochlearia officinalis*) is to be found chiefly on the sea shore, but it often extends for miles inland, especially along the banks of the estuaries of rivers. It is a smooth, succulent plant, from four to eight inches high. The little white flowers have spreading petals, and are arranged in a short raceme; and the fruit is globular or oval, nearly a quarter of an inch long, pointed at the top, with several seeds in each cell. This plant commences to flower in May, and continues in bloom until August.

The Common Whitlow Grass (*Draba verna*) is a very small and inconspicuous plant, abundant on banks and hedgerows, bearing minute, white flowers in April and May. It has a cluster of narrow, toothed, hairy, radical leaves, from a quarter to half an inch long, that spread horizontally close to the ground; and a leafless stem, from one to four inches long, bearing a raceme of flowers on slender pedicels. The petals of the flowers are deeply notched; and the fruits are oblong, about a quarter of an inch long and half that width, containing many seeds.



THE SCURVY GRASS.



THE COMMON WHITLOW GRASS.

Two species of Winter Cress (genus *Barbarea*) are common in waste land—the Common Winter Cress or Yellow Rocket (*B. vulgaris*), and the Early Winter Cress or American Cress (*B. præcox*). The former is an erect plant, from one to two feet high, with numerous, small, yellow flowers in a loose raceme, blooming from May to August. The radical leaves are pinnately divided, with a large, rounded, terminal lobe, and side lobes becoming smaller towards the base; and the upper leaves are oval and irregularly toothed. All the leaves are smooth and glossy, and of a deep green colour. The fruits are short, and thicker than the pedicels. A double variety of this flower is commonly cultivated in flower gardens.



The Yellow Rocket.

The Early Winter Cress is a very similar plant, flowering at the same time, but is of a more slender habit, and has narrower leaves, the upper of which are pinnately divided. The flowers are also larger, and arranged in a closer raceme; and the fruit is longer, but not thicker than the pedicel. This species is cultivated as a salad, and frequently occurs as a garden escape.

Two species of *Sisymbrium* are also very common—the Garlic Mustard (*S. alliaria*), also known as Sauce Alone and Jack-by-the-Hedge; and the Thale Cress or Wall Cress (*S. Thaliana*). The first named is one of the commonest of our hedgerow flowers. It grows to a height of one or two feet, and bears, from April to June, a corymbose cluster of pure white flowers, each about a quarter of an inch in diameter. The stem and leaves, when crushed, emit a distinct odour of garlic. The former is slightly branched; and the leaves are large, stalked, broadly cordate, with many prominent veins, coarsely toothed, and of a delicate green colour. The fruits are erect, about two inches long, on short pedicels.

The Thale Cress grows on dry banks and walls, and displays its minute white flowers from April to the end of the summer. The stem is erect, slender and branched, from six to ten inches in height; and the leaves, which are nearly all radical, are simple, oblong-lanceolate, toothed and downy. The fruits of this species are erect, narrow, with four obscure angles, and about twice as long as their stalks.

The Rape or Cole-seed (*Brassica napus*) is a cruciferous weed commonly occurring in cultivated ground, and often cultivated for its seeds. It grows from one to two feet high, and bears corymbose clusters of yellow flowers during May and June. Its

root is fusiform (spindle-shaped), and all its leaves are smooth and of a sea-green colour. The lower leaves are lyrately pinnate, with toothed edges; and the stem leaves are ovate-lanceolate, acute, embracing the stem. The pods spread as they ripen.

The Wild Turnip (*Brassica Rapa*) is a very similar plant, producing its yellow flowers from April to July. Its root is tuberous and fleshy. The lower leaves are hairy and rough, and not of the glaucous green characterising the last species, while the upper leaves are glaucous and smooth.

The Sweet Violet (*Viola odorata*)—the favourite flower of wayside banks—is common in many parts, and is generally very easily distinguished from other similar species of the order (*Violaceæ*) by its pleasing fragrance. It has a short root-stock, and, usually, long creeping runners. At the top of the stock is a cluster of long-stalked leaves, broadly heart-shaped in form, blunt, with crenate margins and a slightly downy surface. At the base of the leafstalks are very narrow, entire stipules; and from among these arise the slender flower-stalks, of about the same length as those bearing the leaves, with a pair of small bracts a little above the middle. The flowers are solitary, drooping, of a violet, lilac, or white colour, with obtuse sepals; a short, blunt, straight spur to the lower petal; and a hooked, pointed stigma. The conspicuous, scented flowers with which we are so well acquainted, bloom from March to April; but all through the summer the plant bears small petalless flowers that produce the seeds.

Of the order *Caryophyllaceæ* our first example is the Ciliated Pearlwort (*Sagina ciliata*), a small, creeping plant, flowering in May and June in dry places. The leaves are very small, narrow, ciliated, terminating

abruptly in a sharp point; and the two of each pair are united at their bases. The flowers are very small and stalked; and the petals are either very minute or absent. The sepals, stamens, styles, and valves of the capsule, are each four; and the sepals lie close against the capsule.

The Procumbent Pearlwort (*S. procumbens*), also found in dry places, is a similar little plant, smooth and prostrate, with very small white flowers that appear in May and bloom till the end of the summer. The peduncles of this species curve backward just after flowering, but become erect afterwards; and the sepals, which are sometimes five in number, are not close against the fruit, as in the last, but spreading.



THE PROCUMBENT PEARLWORT.

The genus *Stellaria* includes some plants with pretty, white, star-like flowers, some of which adorn our hedgerows in early spring. The most conspicuous of these is the Greater Stitchwort or Satin Flower (*S. Holostea*), the flowers of which are three-quarters of an inch in diameter, and are arranged in loose, leafy cymes. The sepals have no veins, and are about half as long as the petals, which are so deeply cleft that the flower, at first sight, appears to possess ten instead of five.

The Lesser Stitchwort (*S. graminea*) is a very similar

flower, common in dry places, blooming from May to August. The plant is smooth, and does not possess the glaucous hue of the last species. The stem is very straggling and slender, from one to three feet long; and the leaves are grass-like, sessile, and acute. The flowers are very similar to those of the Greater Stitchwort, but are smaller. The sepals have each three veins, and are as long as the petals.



THE GREATER STITCHWORT.

The Little Chickweed (*S. media*), so troublesome in our gardens, belongs to the same genus. Its decumbent, branching stem has a longitudinal line of hairs placed alternately on opposite sides from joint to joint; and its ovate, smooth, succulent leaves are

shortly pointed, the lower ones having hairy stalks. The little star-like, white flowers grow from the axils of the leaves, and have each five hairy sepals, as long as the deeply-cleft petals, with narrow, membranous margins.

These three species of *Stellaria*, and, in fact, all the species of the genus, are distinguished by their divided petals and the presence of three styles; but there is another group of flowers in the same order known as the Mouse-ear Chickweeds (*Cerastium*), also with divided petals, but having either four or five styles.



THE CHICKWEED.

Three of the species of this group may be included among the spring flowers of waysides. One of these

is the Broad-leaved or Clustered Mouse-ear Chickweed (*Cerastium glomeratum*), which flowers from April to the end of the summer. It has an erect, sticky, hairy stem; and pale green ovate leaves. The little white flowers are tufted, on short stalks, with sepals and petals of equal length. A second—the Narrow-leaved Mouse-ear Chickweed (*C. triviale*)—has a similar but spreading stem; and the leaves are narrow, and of a deep green colour. In this one, too, the sepals and petals are equal; but the former are hairy, and the flower-stalks are longer. The other is the Field Mouse-ear Chickweed (*C. arvense*), which has numerous white flowers, in forked cymes, blooming from April to August. Its stem is hairy, prostrate, from six to ten inches long; the leaves very narrow; and the sepals only about half as long as the petals.



THE BROAD-LEAVED MOUSE-EAR CHICKWEED.

The pretty Wild Geraniums, of which there are several species, often form a very attractive feature of the wayside. They are readily recognised as a group by the swollen joints of their stems; the simple, stipuled, lobed leaves; the axillary flowers; and the fruit composed of five distinct carpels, with their five long styles adhering to a long central beak. The flowers have five distinct petals and sepals, and

ten stamens, five of which become alternately larger. When the fruit is ripe the five carpels separate, and are raised by the curving of the smooth styles which remain for a time attached to the beak.

In early April, and from then to August or September, the Dove's-foot Crane's-bill (*Geranium molle*) may be seen in flower by the wayside. The plant is prostrate, soft and downy, with rounded leaves lobed and cut. The pretty pink or lilac flowers are from a third to half an inch in diameter, with abruptly-pointed sepals and notched petals. This species may be readily distinguished from similar plants of the same genus by the smooth, wrinkled capsules, and smooth seeds.

A second species—the Jagged-leaved Crane's-bill (*G. dissectum*)—is also very common in wastes and by waysides. It is a hairy, rather than a downy plant, with spreading stems from one to two feet long; and displays its bright red, shortly-stalked flowers from April to August. The flowers, which vary from a quarter to half an inch in diameter, have long-pointed sepals and notched petals.



THE DOVE'S-FOOT CRANE'S-BILL.

A third species, also very common, is the Herb Robert (*G. Robertianum*), characterised by a strong odour, and red, hairy, spreading, succulent stems one or two feet long. The leaves are compound, with three or five deeply-divided leaflets, and turn to a bright crimson colour in late summer. The flowers are half an inch or more in diameter, with ovate entire petals, of a pink colour and beautifully veined.

The sepals have long points, and are rendered very viscid by glandular hairs. A white-flowered variety of this geranium is occasionally seen.

We have now to note four of the spring leguminous plants (order *Leguminosæ*)—plants belonging to the Pea family, distinguished by their butterfly-like flowers, and, usually, by compound, stipuled leaves. Our first example is the Black Medick or Non-such (*Medicago lupulina*) which is common in wastes, by the waysides and in pastures. This is a procumbent, spreading plant, with stems from six inches to two feet in length, and leaflets inversely egg-shaped, with finely-toothed edges. The flowers, which appear in April, and continue to bloom till near the end of the summer, are small, yellow, and arranged in dense oblong spikes. The calyx has five teeth, and the pods are kidney-shaped, each with only one seed.



THE JAGGED-LEAVED CRANE'S-BILL

In shady grassy or bushy places we may see the Crimson Vetch or Grass Vetchling (*Lathyrus Nissolia*) which, although not common, is rather frequent in the midland and southern counties of England. It is a very slender plant, from one to two feet high, bearing crimson flowers in May and June, and may be identified at once by reference to our illustration.



THE HERB ROBERT.

The pretty Bird's-foot (*Ornithopus perpusillus*) is commonly found on waste ground, more particularly on sandy soils. It has a spreading, prostrate stem, from six to eighteen inches long, and pinnate leaves with from about fifteen to twenty-five elliptical, downy leaflets. The flowers appear to be pink when viewed from a distance; but, when examined closely, are seen to have cream coloured petals that are veined with crimson. They are arranged in heads, of a few flowers each, on long stalks, with a leaf immediately below each head. The pods are curved,

and made up of from seven to nine oval, one-seeded joints, with a terminal beak resembling the claw of a bird, so that each cluster of pods has much the appearance of a bird's foot. This plant flowers from April to July.

Our other example of leguminous flowers is the Bush Vetch (*Vicia sepium*)—a climbing plant with stem two or three feet long, very common in hedges, flowering from April to August. The leaves are pinnate, with from twelve to eighteen oval, blunt leaflets which increase in size towards the base. The flowers are pale purple, and are arranged in axillary racemes of from four to six, on very short peduncles. The style is tufted on one side, and the pods are smooth and erect.

We have now to note a flower of the Rose order (*Rosaceæ*), but since it is common for a beginner to be confused by the general resemblance of some of the flowers of this group to some of the *Ranunculaceæ*, it may be well to point out that in the latter the stamens are united to the receptacle of the flower, below the carpels, while in the rose order the stamens are attached around or on the ovary itself.

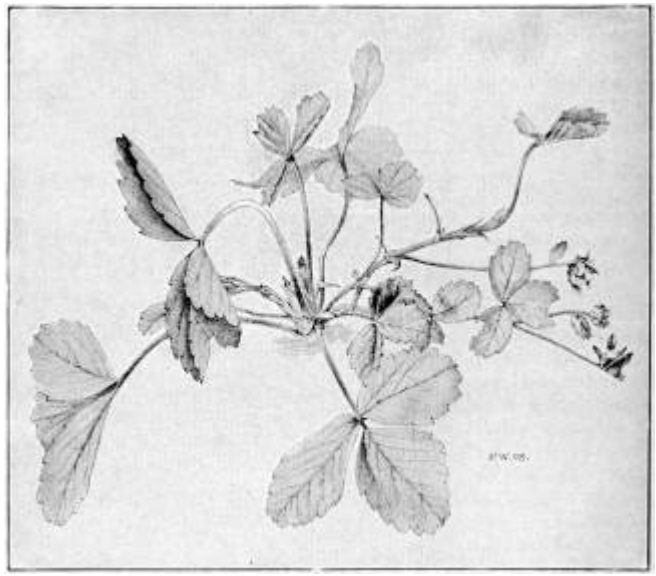


THE GRASS VETCHLING.

The Strawberry-leaved Cinquefoil or Barren Strawberry (*Potentilla Fragariastrum*) is very similar to the Wild Strawberry, with which it is often confused; but no difficulty will arise if it be noted that the species we are now considering produces no running stems. The Barren Strawberry is a silky little plant, with a thick, prostrate stem; and, as one of its popular names implies, a ternate leaf resembling that of the Wild Strawberry. The flowers are white, half

an inch or less in diameter, on slender peduncles, with notched petals. This is one of our earliest spring flowers, blooming from February or early March to about the end of May; and is very common on banks, in hedgerows, and in weedy wastes.

The Tuberous Moschatel (*Adoxa Moschatellina*) is a very inconspicuous but an interesting little plant. It is sometimes placed in the same order (*Araliaceæ*) as the Ivy, while some botanists regard it as belonging to the Honeysuckle family (order *Caprifoliaceæ*). It has a scaly, creeping, thick, underground stem or rhizome, and a four-angled aerial stem; and the whole plant emits the scent of musk. The flowers are small, of a yellowish-green colour, and are clustered together into five-flowered, terminal heads. The petals are spreading, the stamens four or five in number, and the fruit is berry-like, with one-seeded chambers. The plant is only four or five inches in height, and though not common, may be found in shady places in many parts. It flowers during April and May.



THE STRAWBERRY-LEAVED CINQUEFOIL.

The White or Red-berried Bryony (*Bryonia dioica*) is a very common hedgerow climber, the only British representative of its order (*Cucurbitaceæ*). It has a very thick rootstock; a slender stem, that often reaches a length of ten feet or more; large, bright green, palmate leaves with three, five or seven angular, coarsely-toothed lobes; and long simple or branched tendrils. The flowers are imperfect, the males and females growing on separate plants. The former are of a pale yellow colour, in stalked clusters, each one consisting of a spreading, five-lobed corolla, about half an inch in diameter, and five stamens, one of which is free, while the other four are united in pairs: the females are smaller, generally in pairs, each consisting of a globular ovary with three stigmas, and a superior, five-lobed corolla. The fruit is a scarlet or orange-coloured berry, about a third of an inch in diameter, containing several

seeds. The whole plant is clothed with small, white hairs, and contains an acrid sap. Time of flowering—May to September.



THE MOSCHATEL.

The Common Beaked Parsley (*Anthriscus vulgaris*), of the order *Umbelliferæ*, is very common by waysides, flowering during May and June. The stem of this plant is smooth and shining, from two to three feet high, slightly swollen at the nodes. The leaves are tripinnate, with blunt segments, and slightly hairy on the under side. The white flowers are arranged in compound umbels with short stalks, and the umbels

droop before the flowers open. There are no bracts at the base of the main pedicels, but five or six *bracteoles*, with fringed edges, lie at the foot of the secondary pedicels. The fruits are short, ovate, with short beaks and hooked bristles. As with the other members of this genus, the petals have an inflexed lip.

This genus includes the Chervil or Wild Beaked Parsley (*A. sylvestris*), which is very common in hedges and waysides, flowering from April to June. It grows from three to four feet high, and has tri-pinnate leaves with coarsely-serrated edges. The umbels are terminal, on long stalks. There are no bracts, but about five narrow, ovate bracteoles with fringed edges. The flowers are white; and the fruits are long and narrow, smooth, with short beaks.



THE WHITE BRYONY, CLIMBING OVER A BED OF NETTLES.

The Garden Beaked Parsley (*A. cerefolium*) is very similar to the last species, but has only three bracteoles in a whorl, and the umbels are lateral and shortly stalked. Also, the fruit, which is of the same form, has a longer beak. This species is not a native, but is often found as a garden escape. It grows to a height of about eighteen inches, and flowers from May to July.

Our last example of the *Umbelliferæ* is the Goutweed, Bishop-weed or Herb Gerard (*Ægopodium Podagraria*), a rather coarse, erect, smooth plant, from one to two feet high, commonly seen in wayside ditches and other damp places. It was formerly cultivated largely for medicinal purposes, consequently it is to be found chiefly near towns and villages, where it occurs as a garden escape. It has a creeping, aromatic stock; a hollow, grooved stem;

large long-stalked, biternate radical leaves, with ovate or narrow, toothed segments, two or three inches long; and smaller stem-leaves with fewer segments. The flowers are greenish white, in umbels of many rays, with few or no primary or secondary bracts; and the fruits are oblong, about a sixth of an inch long, with the two diverging styles curved downward. The plant flowers from May to August.



THE WILD BEAKED PARSLEY.

On dry banks by the wayside we may commonly meet with the Crosswort or Mugwort (*Galium Cruciatum*) of the Bed-straw Family (*Rubiaceæ*). It is a prostrate plant, with stem from six to eighteen inches long; and soft, downy, elliptical leaves arranged crosswise in whorls of four. Its fragrant little yellow flowers are in whorled, axillary cymes, each cluster having from six to eight blossoms. The lower flowers have stamens and no pistil, and the upper ones pistil only. The fruits are smooth. The time of flowering is from April to June.



THE GARDEN BEAKED PARSLEY.

Composite flowers (Order *Compositæ*) are mostly summer-bloomers, but three at least are very common by waysides in spring. One of these is the Mouse-ear Hawkweed (*Hieracium Pilosella*), a slender plant with leafy runners, rendered silky in appearance by long, soft hairs. The stem is almost leafless, but there are elliptical-lanceolate, entire,

radical leaves covered, especially on the under side, by starlike hairs. The yellow heads are solitary, on stalks varying from two to ten inches long. This species flowers from May to August.

The second species is the Common Groundsel (*Senecio vulgaris*), which may be seen in bloom throughout the year. Though so well known, we think it advisable to call attention to one or two of its characteristic features. The leaves are smooth, deeply cut, toothed, and half clasp the stem. The flower-heads have no ray florets; and the outer bracts are very short, with black tips.

From March to April almost all damp places are more or less thickly dotted with the bright yellow flowers of the Colt's-foot (*Tussilago Farfara*); and later, after all the flowers have ceased to bloom, the same places are covered with the large, heart-shaped, angular leaves, four or five inches wide, thickly clothed beneath with a loose, cottony down which is also sparingly scattered over the upper surface. The early flowering stems are rather thick and fleshy, about six inches high, and downy. They bear a number of small, narrow, erect, scale-like leaves, and, at the top, a single flower-head, surrounded by a whorl of narrow bracts, and a few smaller outer bracts. The inflorescence consists of several whorls of narrow, strap-shaped, outer florets, with no stamens; and a few central, tubular, perfect florets. The fruits are cylindrical, with a tuft of long, simple hairs.

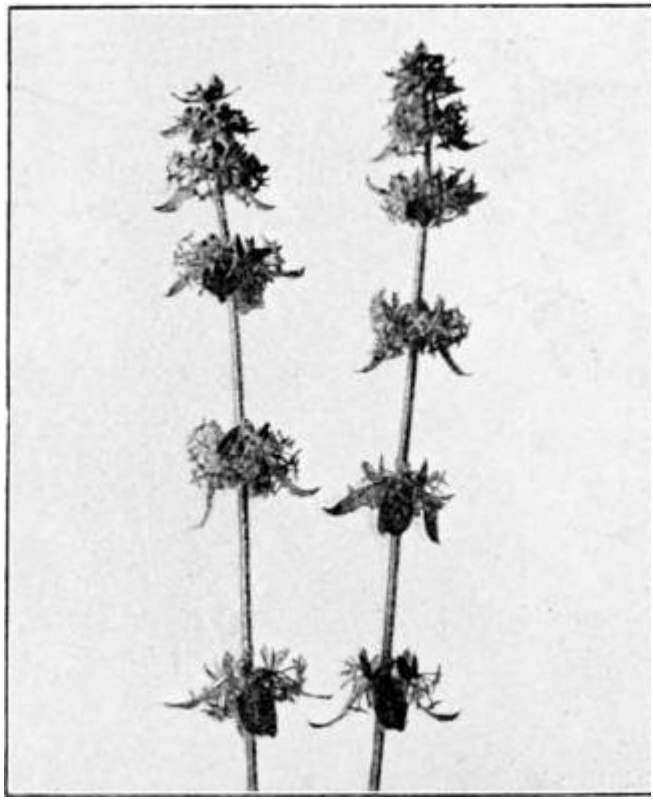


THE GOUTWEED.

The Speedwells (*Veronica*) belong to the order *Scrophulariaceæ*. They are all herbs, with simple leaves; slightly irregular flowers with an unequally four-cleft, spreading corolla, the lower lobe of which is smallest; and only two stamens. At least six species of this genus may be found by waysides, in flower during the spring months.

One of these—the Thyme-leaved Speedwell (*Veronica serpyllifolia*), is common in most waste places. It is a small plant, with a downy, prostrate stem from three

to ten inches long. The leaves are broadly elliptical, slightly crenate, blunt, and somewhat leathery in nature. The flowers are about a quarter of an inch across, of a light blue or lilac colour, striped with dark blue veins; and appear from May to July. They are arranged in several spike-like, many-flowered racemes. The corolla tube is very short; the style long and persistent; and the fruits are inversely-cordate capsules.



THE CROSSWORT.

The Common Speedwell (*V. officinalis*) is a small plant, with hairy, prostrate stems from two to ten

inches in length. It is common in dry places. The leaves are opposite, elliptical, serrate, with short stalks. The pale blue flowers, which are only about a sixth of an inch in diameter, are in many-flowered, axillary, spike-like racemes. The capsules are of the same form as in the last species, but are deeply notched. This species flowers from May to July.

The Germander Speedwell (*Veronica Chamædrys*) is one of our most beautiful and most abundant spring flowers. It is very common on banks and by roadsides, flowering during May and June. Its stem is weak, decumbent, rooting at the base, often considerably more than a foot in length, and remarkable for the line of hairs that changes to alternate sides at each node. A raceme of flowers, much longer than the leaves, arises from several of the nodes. The flowers are bright blue, about half an inch in diameter, with a four-cleft calyx; a deeply four-cleft corolla, the lower lobe of which is narrowest; and two prominent stamens. The fruit is a very broad, flat capsule, notched at the top, narrowed towards the base, splitting into two valves when ripe.



THE COLT'S-FOOT IN EARLY SPRING.



THE GERMANDER SPEEDWELL.

A fourth species, the Wall Speedwell (*V. arvensis*), is

abundant on walls and dry roadsides. It is a prostrate, downy plant, generally more or less thickly covered with dust, flowering from April to about the end of summer. The stem is from four inches to a foot in length, and two lines of hairs run along the branches. The leaves are oval-cordate, crenate, and slightly stalked. The flowers are very small and inconspicuous, and are frequently almost completely hidden by the crowded upper leaves. They have very short corolla-tubes, and are arranged in loose, terminal, spikelike racemes.

The Grey Field Speedwell (*V. polita*) is common in waste places and rough fields, flowering from April to September. Its flowers are bright blue, about a quarter of an inch across, solitary, axillary, on stalks which are longer than the leaves. The sepals are broadly oval and pointed, and the petals are all of the same colour. The leaves of this plant are stalked, cordate, and irregularly toothed.

Our last example of the order is the Green Field Speedwell (*V. agrestis*), also common in fields and by the roadside. It has several prostrate stems, from four to eight inches long; and stalked, cordate leaves with irregularly serrate margins. The flowers are small, about a fifth of an inch across, solitary, axillary, on stalks shorter than the leaves. The sepals are narrow, oblong, and blunt; and the lower petal is white. This species flowers from April to the end of the summer.



THE WHITE DEAD NETTLE.

The Dead Nettles (genus *Lamium*, of the order *Labiatæ*) may be readily distinguished from the Stinging Nettles, with which they are often confused, by their square stems, and whorls of showy, lipped flowers. Further, these flowers may be recognised from among the others of their own order by the ten-ribbed, bell-shaped calyx; and by the one or two teeth on each side of the lower lip of the corolla.

Three of this group are very common wayside spring flowers. One is the White Dead Nettle (*Lamium album*), with large, white flowers forming whorls in the axils of the leaves. The leaves of this plant are all

stalked, cordate, with a very sharp point, deeply serrate, and often marked with white blotches. The teeth of the calyx are narrow, as long as the tube, with long slender points; and the tube of the corolla is curved, longer than the calyx, gradually widening from below upwards. The two lower stamens are longer than the upper pair, and the anthers are black. The plant varies from six to eighteen inches in height, and flowers from April to September.

The Red Dead Nettle (*L. purpureum*) grows to the same height, but has much smaller cordate or kidney-shaped leaves, with blunt apices and crenate edges. The upper ones are very crowded, and often tinged with red; and all the leaves are stalked. The flowers are small, of a red-purple colour (rarely white), in crowded whorls in the axils of the upper leaves. The tube of the corolla is straight, longer than the calyx; and the calyx teeth are spreading.



THE YELLOW PIMPERNEL.

The third species—the Cut-leaved Dead Nettle (*L. incisum* or *L. hybridum*)—is not so abundant as the other two, but moderately common on waste land. Its leaves, which are all stalked, are very deeply cut in a serrate manner; the lower ones being cordate, while the upper are more triangular. The flowers are of a rose-red colour, in crowded whorls near the top of the stem. The tube of the corolla is *shorter* than the calyx, and straight; and the teeth of the calyx are about as long as its tube. The plant grows from six to eighteen inches in height, and flowers throughout the whole of spring and summer.

Another common Labiate—the Ground Ivy (*Nepeta*

Glechoma)—may be seen almost everywhere in the spring, in bloom from March to May. It has a procumbent, creeping stem, and deeply-crenate, kidney-shaped leaves. The flowers are of a blue-purple colour, arranged in whorls of three or four in the axils of the leaves. The calyx has five teeth and fifteen ribs; and the two front stamens are shorter.



THE DOG'S MERCURY.

The Early Field Scorpion Grass (*Myosotis collina*) belongs to the order *Boraginaceæ*—a family of (usually) hairy herbs with alternate leaves and one-sided spikes or racemes of showy flowers. The flowers have a five-lobed calyx and corolla, five

stamens, and a fruit of four nutlets. It is in the same genus as the familiar Forget-me-not, and, in fact, somewhat closely resembles that plant, which is often confused with certain species of Scorpion Grass. It is a slender, more or less prostrate herb, with blunt oblong leaves; and minute, bright blue flowers which are at first hidden among the leaves, but afterwards exposed by the lengthening of the stem. The flowers have very short pedicels; and are in long, slender, leafless, spikelike racemes, with a single flower some distance down, in the axil of the highest leaf. The popular name of Scorpion Grass has been given on account of the characteristic arrangement of the flowers when in the bud, these being then tightly coiled in a scorpoid fashion. In order that the present species might be distinguished from allied plants, we should note that the pedicels are shorter than the calyx; that the calyx is furnished with hooked bristles, and is open and swollen when the fruits are formed; also that the tube of the corolla is very short. The Early Field Scorpion Grass is very common on dry banks. Its stems vary from about four to ten inches long, and the flowers appear during April and May.

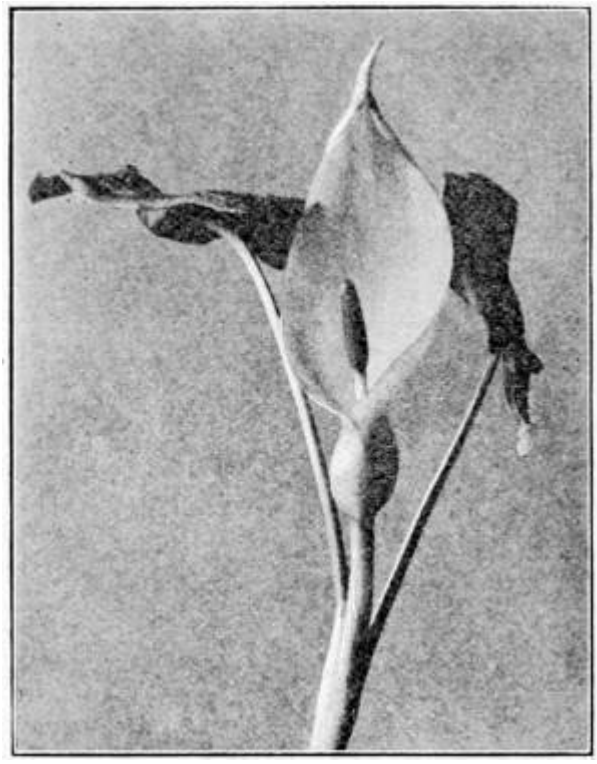


THE BLACK BRYONY IN FRUIT

The Wood Loosestrife or Yellow Pimpernel (*Lysimachia nemorum*) of shady waysides and woods is a member of the *Primulaceæ* or Primrose family. It is altogether a pretty little plant, much like the Scarlet Pimpernel in general appearance, but somewhat larger and more glossy. It has a prostrate, spreading stem, often tinged with red; and opposite, oval, acute leaves with short stalks. The flowers are yellow, usually a little more than half an inch in diameter, with a spreading corolla. They are axillary, placed singly on very slender peduncles, and have very narrow sepals. This species flowers from May to August.

The Perennial or Dog's Mercury (*Mercurialis perennis*), of the *Euphorbiaceæ* or Spurge family, is one of our earliest spring flowers, and may be seen in abundance on almost all shady waysides, in bloom from March to May, and growing from six to eighteen inches high. The minute green flowers, which have three sepals and no petals, are in racemes or spikes that grow from the axils of the upper leaves. They are unisexual; the staminate flowers in slender racemes, with several erect stamens; and the pistillate ones in short, few-flowered spikes, with a two-celled ovary, two styles, and a few imperfectly formed stamens.

The Black Bryony (*Tamus communis*)—order *Dioscoriaceæ*—is a pretty climbing plant, the slender stem of which twines for several feet among the hedgerow trees and shrubs. Its leaves are cordate and acute, and change either to a bright yellow or a beautiful bronze colour in the autumn. The flowers, which appear in May and June, are yellowish green, in small clusters; and the fruits are oblong berries, turning to a bright scarlet as the leaves assume their autumn tints.



THE WILD ARUM.

Our next flower is the peculiar and interesting Wild Arum (*Arum maculatum*), of the order *Araceæ*, also known as Lords and Ladies, Cuckoo Pint, and Wake Robin. It is a very common flower of shady waysides, blooming during April and May. The plant is succulent, with a short, fleshy rhizome; and large, smooth, sagittate leaves that are often spotted with purple. The floral stalk is thick and fleshy, and supports numerous unisexual flowers which are clustered round a central axis or *spadix* that is prolonged above into a club-shaped appendage. The whole of the spadix is surrounded by a large bract or *spathe* which is contracted a little distance above its

base. The portion of the spathe below the constriction encloses the flowers, and remains permanently closed as long as they are in bloom; but the upper part opens on one side, just before the flowers begin to mature, exposing the club of the spathe. The club is thick and fleshy, and coloured either dull purple, bright red, pink, or yellow. The pistillate flowers are clustered round the bottom of the spadix, and consist of a number of sessile ovaries. Above them is a ring of imperfect flowers consisting of styles only, and above these again is the cluster of staminate flowers, with some aborted stamens at the top. After fertilisation has taken place the spathe and the spadix soon wither away, and the ovaries develop into a cluster of large berry-like fruits, each containing a few seeds. These fruits, mounted on the summit of the lengthened, fleshy peduncle, are very conspicuous objects in the autumn hedgerows.

The contrivance by which cross-fertilisation is secured in these flowers is particularly interesting:—Numbers of little insects (midges) are attracted by the brightly coloured club, and, possibly, also by the fœtid odour of the flowers. These creep down the spadix, passing through the narrow neck into the closed compartment below. The neck is more or less obstructed by the upper, abortive, staminate flowers, which consist merely of a few whorls of bristles. Since, however, many of these bristles point downwards, they offer but little obstruction to insects as they enter; but prevent their escape. Thus, on cutting open the lower part of the spathe, we may frequently find quite a number of midges that have been imprisoned, their bodies covered with pollen that has probably been carried from another Arum previously visited. The pistillate flowers are mature first, and thus the imprisoned insects, creeping about

in their cell during this early stage of the flower, are sure to bring pollen cells in contact with some of the ripened stigmas.

After the work of fertilisation has been accomplished, the anthers ripen, setting free abundance of pollen which now covers the bodies of the insects in the place of that which has been rubbed on to the stigmas. Then the abortive stamens, which prevented the escape of the insects, wither; and, at the same time, the neck of the spathe relaxes. Thus the prisoners are again set free, and possibly a large proportion of them enter another flower and repeat the process of cross-pollination.

The commonest of the early-flowering Grasses of the wayside is the Annual Meadow Grass (*Poa annua*)—a small tufted species, varying from a few inches to nearly a foot in height. It commences to flower in March, and remains in bloom till the end of the summer. It is represented on Plate III.

VIII

MEADOWS, FIELDS AND PASTURES—SPRING

It is, of course, impossible to draw a hard and fast line between the flowers of spring and those of

summer, for not only does each individual species vary in the time of its first appearance, according to the nature of the season, but many of the spring and summer flowers overlap in such a manner that it is difficult to decide which season has the greater claim to each one. In the present chapter, however, we shall include those flowers of our fields and meadows which usually *commence* to bloom before the beginning of June, even though they may continue to produce blossoms well into the summer.

One of the most conspicuous features of the meadows in spring is certainly the abundance of those bright yellow flowers known collectively as the Buttercups. But the name of Buttercup, standing alone, has no definite, scientific meaning, the name being applied to quite a number of flowers of the *Ranunculus* genus of the order *Ranunculaceæ*.

The earliest of these is undoubtedly the Pilewort or Lesser Celandine (*Ranunculus Ficaria*), which appears early in April, and often in such abundance as to cover the ground with its leaves and flowers. This flower is not confined to fields and meadows, but often covers large patches of bank and hedgerow, where, together with the Greater Stitchwort, it produces a most brilliant show of white and yellow stars.

The plant has a small rootstock, with a number of little oblong tubers which are renewed every year, and sometimes a branched, creeping stem. Its leaves usually all grow direct from the rootstock, and are stalked, heart-shaped, glossy, with crenate or angled margins. The flower-stalks bear a few small leaves, and a single flower with three sepals, and about eight glossy, oblong, yellow petals. The cluster of carpels in the middle of the flower form a large,

globular head.

A little later in the season our pastures are bountifully bedecked by two of the most familiar Buttercups—the Creeping Buttercup (*R. repens*) and the Bulbous Buttercup (*R. bulbosus*), both of which appear early in May.



THE FIELD PENNYCRESS.

The former grows from six inches to a foot in height, and may be easily distinguished by its creeping stems, which give off root fibres and produce new plants at every node. The flowering stems of this species are clothed with long hairs, and the leaves are divided into three stalked segments which are lobed and toothed, the middle segment projecting much beyond the other two. The flowers are in loose panicles, on long, furrowed stalks, with five yellowish-green, concave, spreading sepals that are shorter than the petals. The carpels are ovate in form, somewhat flattened, arranged in a globular head; and the fruits are smooth. This plant is abundant almost everywhere, and continues to flower till the end of the summer.

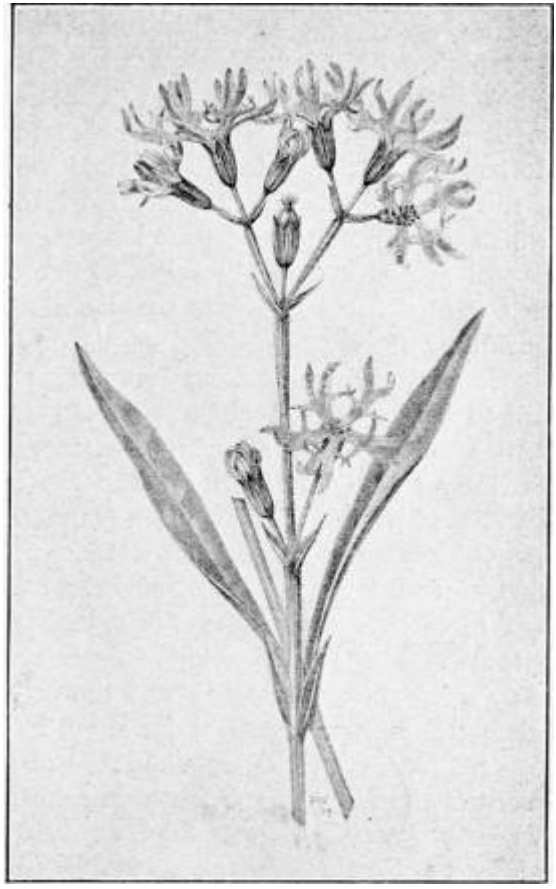
The Bulbous Buttercup is very similar to the last species, but may be known at once by its swollen, bulbous root. Its leaves are divided into three segments which are more or less toothed and lobed, and the sepals bend backwards on the peduncle as soon as the flower opens. Its carpels are smooth, and form a globular head; and the ripened achenes are also smooth. The plant is very abundant. It flowers from May to August.



THE WILD PANSY.

Coming now to the Crucifers, we have first to note the Field Pennycress (*Thlaspi arvense*), which may be recognised at once by reference to our illustration. It is an erect, smooth, plant, from six to twenty inches in height, a common weed in cultivated ground, flowering from May to July. Its radical leaves are stalked, and wither early; and the small white flowers are soon followed by round siliquas, about half an inch in diameter, with a broad wing notched at the top.

The same order includes the Cuckoo Flower, Lady's Smock, or Meadow Bittercress (*Cardamine pratensis*), which is certainly one of our prettiest spring flowers, growing in abundance in most moist meadows, and flowering from April to June. It has a short rootstock, with small, fleshy scales, often so much swollen as to resemble tubers; and the stem is erect, either simple or branched, and a foot or more in height. The leaves are pinnately divided, the leaflets of the lower ones being ovate or round, and those of the upper ones very narrow. The flowers are rather large, white or lilac in colour, with stamens about half as long as the petals, and yellow anthers. The fruits are usually more than an inch in length.



THE RAGGED ROBIN.

One of the common weeds of cultivated fields is the pretty Wild Pansy or Heartsease (*Viola tricolor*), of the order *Violaceæ*. The plant may be easily recognised by its resemblance to the Garden Pansy, which is a variety of the same species. It is very variable, both in regard to its general build, and to the colour and size of the flowers. The plant is either smooth or slightly downy, and its branching stem varies from four to ten inches in length. The leaves

are oblong or cordate, with crenate edges; and each one has a large, leafy stipule which is divided into oblong or very narrow lobes. The flowers are coloured with varied proportions of yellow, white, and purple; and the lower petal, which is the broadest, is usually purple at the base. This species flowers from May to the end of the summer.

In damp meadows, and especially near ditches and in marshy ground, we meet with the Ragged Robin (*Lychnis Flos-cuculi* of the order *Caryophyllaceæ*). This is an erect plant, from one to two feet high, with a viscid stem that is slightly downy and never much branched. The leaves are few and small, the upper ones sessile and the lower stalked. The pretty red or rose-coloured flowers are arranged in a very loose terminal panicle, and have no scent. The petals are each divided into four very narrow lobes, of which the two middle ones are longest; and the fruit is a broad oval capsule, which opens, when ripe, by five teeth. The flowers appear first in May, and continue to bloom till the end of June or the beginning of July.

Several spring-flowering leguminous plants (order *Leguminosæ*) are to be found in fields and meadows, and of these we will first notice the Spotted Medick (*Medicago maculata*), generally easily distinguished by the dark spot in the centre of the leaflets of its trifoliate leaves. It is a smooth plant, with procumbent, branching stems varying from six inches to two feet in length. There are fine, spreading hairs on the leafstalks, and the leaflets are obcordate and toothed. At the base of each leafstalk there is a pair of toothed stipules. The small, yellow flowers are in short, dense racemes, only a few in each cluster; and the pods are little compact spirals, almost globular in

general form, with three or four ridges, and a central furrow broken by a number of fine, curved prickles. The plant is abundant in the southern counties of England and Ireland, where it grows on pasture-land, flowering from May to near the end of the summer.

The Netted Medick (*M. denticulata*), of the same genus, is a similar plant, flowering during the same period, and often seen in the southern and eastern counties of England, especially in fields near the coast. Its prostrate stems are of the same length as those of the Spotted Medick; and its leaves are also very similar, but the stipules are bordered with very fine teeth. The flowers are in small, yellow heads; and the pod forms a loose, flat spiral of two or three coils, deeply netted on the surface, and bordered with curved prickles.

We have next to note several species of Trefoils (genus *Trifolium*), all distinguished by trifoliate, compound leaves, so familiar to us in the clovers; and stipules which adhere to the leafstalks. Their flowers are in dense clusters, and each one has a five-toothed calyx, and an irregular corolla of narrow petals which usually remains, in a withered condition, around the ripening pod. There are ten stamens, the upper one free, while the remaining nine, united by their filaments, form a split tube round the ovary. The pod sometimes contains only one seed, and never more than four.

The Subterranean Trefoil (*T. subterraneum*), which is abundant on the dry pastures of South England, is characterised by a stem, from six to eighteen inches long, which is underground for the greater part. The visible portion of the plant is small, and more or less covered with long, spreading hairs. The leaves are on long stalks, with obovate leaflets, and broad stipules.

The flowers vary in colour from white to pink or crimson, and are usually in hairy clusters of from two to four. As the fruit ripens, the peduncle lengthens and bends downward. At the same time the calyx turns back on the stalk, exposing short fibres, each with five spreading teeth which fold over the fruit. The flowers appear during May and June.

The Dutch Clover or White Clover (*T. repens*) is one of the most familiar of the Trefoils. It is very abundant in English pastures, and has been introduced into Ireland, where it is now often selected as the national emblem in the place of the Wood Sorrel (p. 52), which is regarded by many as the original 'true Shamrock.' The whole plant is smooth or slightly hairy; and its creeping stem, from two to twenty inches in length, sends down root-fibres from its nodes. The leaves have long stalks, with stipules at the base; and the leaflets are broadly oval or obovate, finely toothed, and have usually a lighter, crescent-shaped mark near the middle. The flower-stalks are long, growing from the axils of the leaves; and each one bears a globular head of white or pinkish flowers. The plant flowers from April to the end of the summer.

A very similar species—*T. hybridum*—has been introduced into our country, and has now become established in many places where it was formerly cultivated. Its stipules are larger than those of the Dutch Clover; the pod contains only two seeds; and the flowers are usually pinkish.

The Common Purple Clover (*T. pratense*) is also largely cultivated for fodder, but it is indigenous, and grows abundantly in most parts as a wild plant. It is very similar to the Dutch Clover in general build, but its stem is more or less erect, the flowers are purple,

and the whole plant is generally more hairy. The stipules are ovate, larger, veined, and have long points; and each flower-head has a pair of trifoliate leaves at its base. The individual flowers are about half an inch long; and the hairy calyx has the lower tooth longer than the others. The pod contains only one seed, and is surrounded by the brown, withered corolla, as well as by the calyx, which remains erect while the fruit ripens. This species also flowers from May to the end of the summer.



THE PURPLE CLOVER.

Two of the Vetches (*Vicia*—of the order *Leguminosæ*) are also to be included among our spring-flowering

field-plants. One of these is the Spring Vetch (*V. lathyroides*), which may be found in flower from April to June on dry pastures. It is a small plant, with a hairy stem that gives off spreading branches, from six to eight inches long, at the base. The leaves are pinnate, with two or three pairs of leaflets, rounded and notched at the apex, and no tendrils. The flowers are small, solitary, of a rich purple colour, situated in the axils of the leaves. The pods are smooth and usually less than an inch long.

The other species—the Common Vetch (*V. sativa*)—is a very similar plant, but its trailing stems grow to a length of from one to two feet. Its leaves have from four to seven pairs of leaflets, varying in form from linear to obovate or obcordate, and have branched tendrils. At the base of each leaf is a toothed stipule with, usually, a dark spot in the centre. The flowers are axillary and sessile, either solitary or in pairs, rather large, and of a pale purple colour. The pods are narrow, smooth, from one to two inches long, and contain about twelve smooth seeds. The plant is common in fields, and flowers during May and June. It is represented in Fig. 5 of Plate IV.



THE DAISY.

The very pretty Meadow Saxifrage (*Saxifraga granulata*), of the order *Saxifragaceæ*, is very abundant in the meadows of some parts of England and Scotland, and may sometimes be seen on grassy roadsides. It varies from six to about ten inches high, and flowers during May and June. The stem is erect, simple or slightly branched, and covered with spreading hairs; and the lower leaves are kidney-shaped, either crenate or lobed, having long stalks, while the upper ones are smaller, and either entire or sharply lobed. The rather large white flowers are in terminal cymes of from three to six. The calyx

adheres to the ovary, and has blunt segments; the five petals are about twice as long as the sepals; and both petals and stamens are inserted into the bases of the segments of the calyx. The stamens are ten in number, and the ovary is two-celled, with two styles.

The principal spring-flowering umbelliferous plant of pastures is the common Earthnut or Pignut (*Bunium flexuosum* or *Conopodium denudatum*). This plant has a smooth, slender, stem, with a few forked branches, and is usually leafless at the base on account of the early decay of the lower leaves. Its popular names are due to the large, tuberous rootstock, which has somewhat the appearance of a chestnut, and is often eaten by country folk, and dug out of the ground by pigs. The lower leaves have three stalked segments, each divided pinnately into narrow lobes which are themselves divided; and the upper leaves, which are smaller, are cut into very narrow lobes, the middle one much longer than the others. The small, white flowers are arranged in umbels of from six to ten rays, with a few very narrow bracts or none at all. The umbels are usually terminal, and droop before the flowers are open. The fruit is oval or oblong, slightly flattened, with slightly-spreading styles, and ribs scarcely visible. The plant grows from one to three feet high, and flowers from May to July.

Dealing next with a few composite flowers (order *Compositæ*), we first call attention to the leading characters of the Common Daisy (*Bellis perennis*), which is abundant in fields and meadows almost everywhere, and flowers practically all the year round. It has a tufted, perennial rootstock, from which grows a cluster of obovate leaves, usually smooth, and slightly toothed. The leafless peduncles also start direct from the stock, each one bearing a

solitary flower-head with an outer whorl of nearly smooth bracts; a ray of strap-shaped, white or pinkish florets; and a disc of numerous little yellow, tubular florets.

The Dandelion (*Taraxacum Dens-leonis* or *T. officinale*) is equally familiar as a meadow and wayside plant, commencing to flower in March, and continuing in bloom till October. It has a thick tap-root, with a very bitter taste; and direct from the crown of this grow the spreading leaves and the hollow stalks of the solitary flower-heads. The former vary very considerably in shape, but are usually long and narrow, broader at the apex, and cut into triangular lobes which generally point backwards. Sometimes, however, the leaves are almost entire; and they also vary in colour, from a bright to a very dull green. The peduncles vary from two to eight inches in length; and the florets of the head, which are all yellow, are surrounded by an inner whorl of narrow, erect bracts, and outer bracts which either overlap or are turned back on the stalk. The little fruits have projecting points towards the top, and are provided with a slender beak, three or four times as long as the achene itself, at the summit of which is a tuft of silky hairs.



THE BUTTERBUR.

Our last example of the composite flowers is the Butterbur, variously named *Tussilago vulgaris*, *Petasites vulgaris*, and *Tussilago Petasites*. It resembles the Common Colt's-foot (*Tussilago Farfara*) in several respects; and, as will be seen from the above names, is sometimes included in the same genus. Its leaves are very large, and very similar to those of the Colt's-foot, being cordate and toothed, and appearing after the flowers. The flowering stems each bear a dense cluster of dull pink or purple heads, forming a

raceme from four inches to a foot in height. The pistillate and staminate flowers grow almost exclusively on separate plants. In the former case the heads are larger and densely clustered, each one consisting of filiform, pistillate florets only, or almost entirely of these with a few tubular, staminate florets in the centre. On other plants the flower-heads are smaller and not so densely clustered; and each head consists entirely of tubular, male flowers, or has a few filiform, female florets round the outside. The plant is common in many parts of Britain. It grows in damp meadows, especially along the banks of streams and ditches, flowering from March to May.

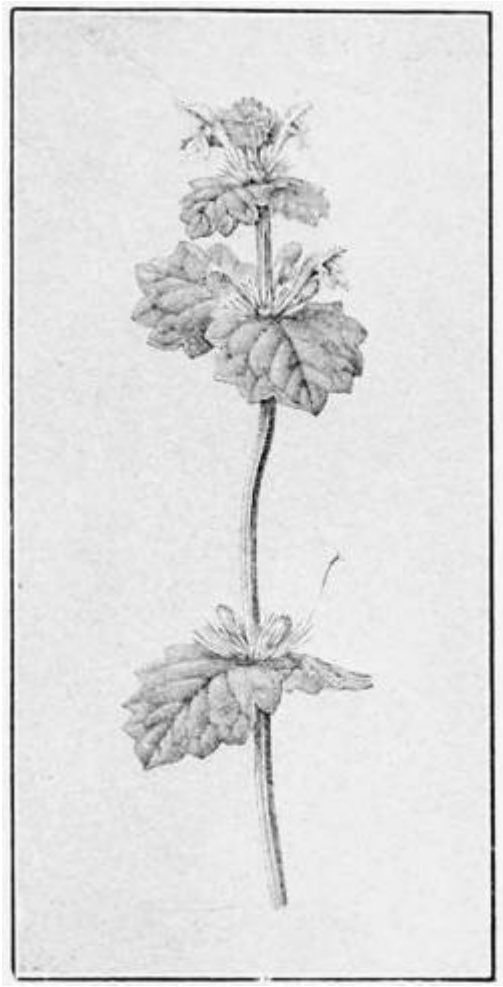


THE YELLOW RATTLE.

The Yellow Rattle (*Rhinanthus Crista-galli*), of the order *Scrophulariaceæ*, is abundant in damp pastures, flowering from May to July. It is a parasitic species, deriving a portion of its food, in the form of ready-made organic compounds, from the roots of surrounding grasses, and its parasitic habits are referred to in Chapter XXIII. Its stem is erect, from six to eighteen inches high; and the leaves are sessile, opposite, lanceolate, and coarsely toothed. The calyx is almost globular, slightly flattened, with four small

teeth. The yellow corolla has a tube longer than the calyx, and terminates in two lips, one or both of which have often a purple spot. The stamens are in two pairs; and the fruit is an almost globular capsule, containing a few large, flat seeds.

In similar situations we may find the Field Lousewort (*Pedicularis sylvatica*) of the same order, also a parasitic species, extracting nourishment from the roots of grasses. It has spreading branches from three to ten inches long, more or less recumbent. Its leaves are alternately arranged, and pinnately cut into small, toothed segments. The flowers are sessile in the axils of the upper leaves, and vary in colour from rose to white. The calyx is broadly oblong, with five unequal lobes. The tube of the corolla is considerably longer than the calyx; and its upper lip has a very small tooth on each side, just under the tip. The plant flowers from April to July.



THE HENBIT DEAD NETTLE.

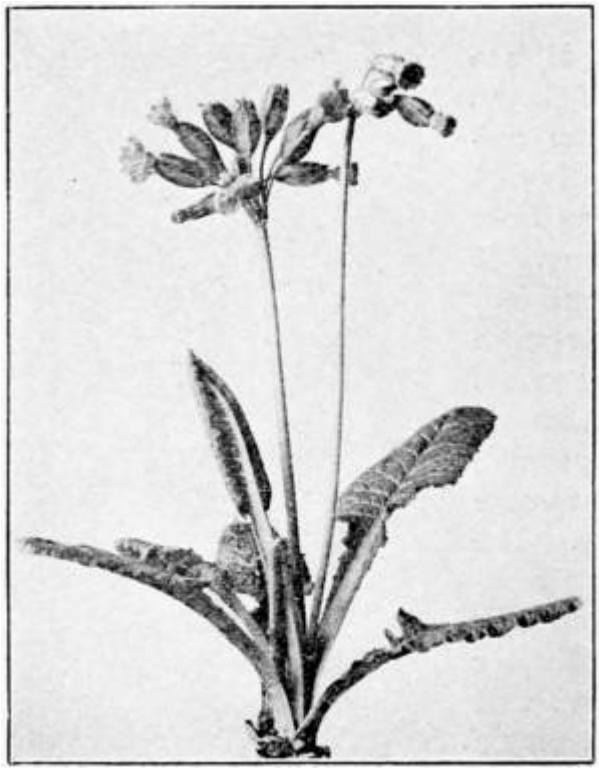
The only common spring labiate flower (order *Labiatæ*) of fields is the Henbit Dead Nettle (*Lamium amplexicaule*), which is frequently met with on sandy soils, flowering from April to the end of the summer. It is a low plant, seldom reaching a foot in height, with a branching stem that is too weak to stand

erect. The upper leaves are sessile, round, much wrinkled, and deeply crenate; while the lower ones, of the same form, are on long petioles. The flowers are arranged in a few compact whorls, in the axils of the upper leaves. The calyx is much shorter than the tube of the corolla; and its five, pointed teeth, which are as long as the tube, bend together as the fruit ripens. The lipped corolla is of a rose or purple-red colour, about half an inch long, with a comparatively long, straight tube.

In damp meadows we frequently see the changing Scorpion-Grass (*Myosotis versicolor*), also known as the Yellow and Blue Scorpion Grass, deriving its name from the fact that the corolla is yellow at first, and afterwards changes to a dull blue. It is a hairy plant, with an erect stem, from four to ten inches high, slightly branched. The leaves are oval or ovate, narrow, and sessile; the lower ones forming a spreading tuft at the base, while the others, few in number, are erect on the stem. The flowers are very small, almost sessile, and arranged in a one-sided, curved raceme. The calyx is deeply cleft into five parts which close quite over the ripening fruit; and the small corolla has a comparatively long tube and five spreading lobes. The plant flowers from April to June. It belongs to the order *Boraginaceæ*.

The Cowslip (*Primula veris*—order *Primulaceæ*) is common in pastures in many parts of Britain. It usually grows from six to ten inches high, and flowers during May and June. The whole plant is clothed with soft, downy hairs; and its leaves are all radical, obovate, narrowed towards the base, and much wrinkled like those of the Primrose. The flowers are arranged in a drooping umbel, on a long stalk. The calyx is tubular, with five broad, blunt

teeth; and the corolla has a long, narrow tube, with five spreading lobes that form a shallow cup.



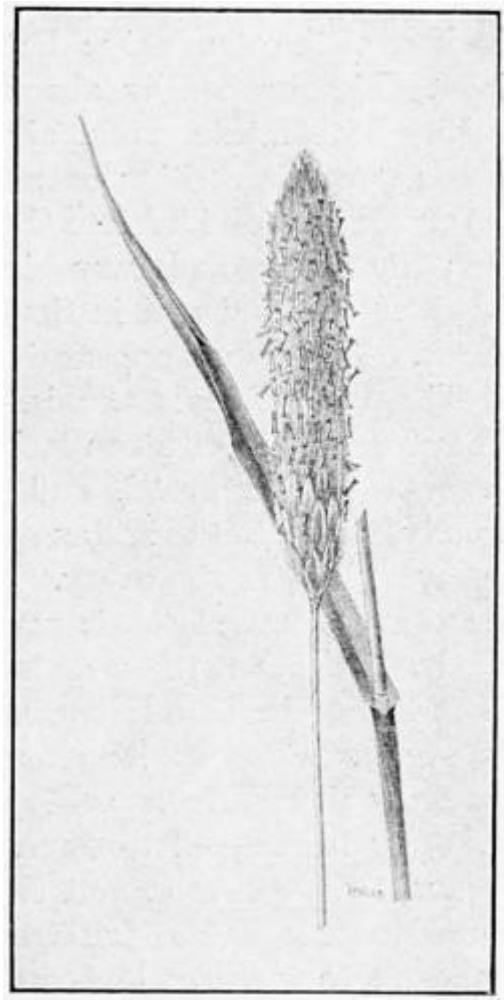
THE COWSLIP.

Two species of Sorrel are very common in meadows and pastures during the spring. They are plants very much resembling the docks; in fact, they belong to the same genus (*Rumex*) of the order *Polygonaceæ*. Both have erect, leafy stems, with sheathing stipules; and numerous, small, green flowers which soon turn red. The latter are imperfect, with a deeply-cleft perianth of six lobes. The male flowers have six stamens; and the females have three styles. The fruits are little triangular nuts, more or less enclosed in the

segments of the perianth.

One of these—the Common Sorrel (*Rumex Acetosa*)—is very abundant in damp meadows and pastures all over Britain. It varies from one to two feet in height, with a stem that is usually unbranched, and flowers from May to July. The leaves have a very acid juice, and are often used as a salad. The radical ones are oblong, arrow-shaped at the base, with pointed lobes, and have rather long stalks; the stem-leaves are smaller, few in number, with shorter stalks. Sometimes both male and female flowers grow on the same plant, but often the plant produces the one kind only. They are arranged in long, leafless panicles; and the outer lobes of the perianth of the female flowers are turned back on the peduncle, while the inner are enlarged and swollen, and close over the fruit.

The other species—the Sheep's Sorrel (*R. Acetosella*)—is a much smaller plant, seldom reaching a foot in height, and often only three or four inches. It grows abundantly in dry pastures and on heaths, flowering from May to July. It is much more slender than the Common Sorrel; and its leaves, which are also acid, are all very narrow, and generally either arrow-shaped or spear-shaped at the base. The flowers are in very slender, terminal panicles, the males and the females always on separate plants; and the latter differ from those of the last species in that all the segments of the perianth close over the fruit.



FOX-TAIL GRASS.

Coming now to the monocotyledonous plants, we have first to note three flowers of the order *Orchidaceæ*, the general features of which are described in Chapter XVIII; and the reader is advised to refer to this short account of the leading characteristics of the group before attempting to

identify the present species.

The first is the Twayblade (*Listera ovata*), frequently seen in moist pastures, as well as in woods, flowering from May to July. The stem of this plant is usually from one to two feet high, with a few sheathing scales at the base; and the species can be recognised at once by its two broad oval leaves, almost exactly opposite one another, from two to four inches long, and about six inches from the ground. The flowers are of a yellowish-green colour, in a long slender raceme; and each one has a long lip, divided into two very narrow lobes.

The other two belong to the genus *Orchis*. They are the Green-winged Meadow Orchis (*O. Morio*), and the Early Purple Orchis (*O. mascula*), and may be distinguished by the following summary of their characteristics:

The Green-winged Orchis.—Root with two undivided tubers, and stem from six to twelve inches high. Leaves few, narrow, at the base of the stem only; but a few, loose, sheathing scales above them. Flowers usually about eight in number, forming a loose spike. Bracts thin, pink, about the same length as the ovary. Sepals purplish, arching over the smaller petals. Lip longer than the sepals, and divided into three short lobes. Spur a little shorter than the ovary, and very blunt. The plant is abundant in the South of England and in South Ireland, but less common in the North. The flowers appear during May and June.

The Early Purple Orchis.—Root with two undivided tubers. Stem from six to eighteen inches high, including the loose spike of flowers. Leaves broad, and often spotted. Flowers numerous, usually purple, but sometimes pink or even white. Bracts coloured, nearly as long as the ovary. Upper sepals and petals

arched over the ovary; lateral sepals acute, and turned upwards and backwards. Lip about the same length as the sepals, divided into three short lobes, the middle one notched, and the lateral ones turned backward. Spur as long as the ovary, obtuse. The plant is generally distributed, growing in moist meadows and in woods, flowering from April to June.

Finally, we have to note two early-flowering grasses of pastures. One of these is the Fox-tail Grass (*Alopecurus pratensis*), which grows from one to two feet high, and may be identified with the aid of our illustration. The other is the Slender Fox-tail (*A. agrestis*), a very similar plant, but its spike of flowers is narrower, especially towards the top, and the sheaths of its leaves are not so loose as in the former.

IX

BOGS, MARSHES AND WET PLACES IN SPRING

The cold soils of bogs, marshes, and other wet places do not produce a very great variety of flowers during the spring months; but some there are which appear in great profusion; and others, though less conspicuous, are sufficiently abundant and interesting to be included in our list.

Our first is the beautiful Marsh Marigold (*Caltha palustris*) of the Buttercup family (*Ranunculaceæ*), which is exceedingly abundant in marshes and by the sides of muddy ditches in most parts of Britain, flowering from March to June. It is represented on Plate V, and may be distinguished at once from the other members of its family by its glossy leaves, and its large flowers, varying from one to near two inches in diameter.

A little later in the season we may meet with the pale blue or lilac flowers of the Marsh Violet (*Viola palustris*—order *Violaceæ*), which generally make their first appearance in April, and continue until June or July. The plant is much like the well-known Sweet Violet in general appearance, but is smaller, with a creeping stock; and the whole is smooth with the exception of a few scattered hairs on the flower-stalks. Its leaves are either round, heart-shaped, or kidney-shaped, with slightly-waved edges, and often of a purplish hue beneath. The flowers are smaller than those of the Sweet Violet, scentless, with pale petals; and the spur of the corolla is very short and blunt. The plant is rather local in the southern counties of England, but is decidedly abundant in the bogs and marshes of North Britain.

Few of the spring bog-flowers are more interesting than the pretty little Sundews (*Drosera*), so remarkable on account of their carnivorous nature. A description of the three British species will be found in Chapter XXIV, which contains also an account of their peculiar habits.

Coming next to the order *Caryophyllaceæ* we have to note two of the Stitchworts or Starworts (*Stellaria*)—slender plants distinguished by their opposite, pointed leaves; jointed stems; and little, white, star-

like flowers. They have five sepals; five petals, deeply divided into two lobes; ten stamens; three styles; and a capsular fruit that splits longitudinally, with many seeds.

One of these is the Glaucous or Marsh Stitchwort (*Stellaria glauca* or *S. palustris*), which is widely distributed though not very common. The whole plant is slender, with a four-angled stem from six to eighteen inches high; and narrow, sessile, undivided leaves that taper to a point. Its flowers are solitary on axillary peduncles, from half to three-quarters of an inch in diameter, with petals much longer than the three-veined sepals. They first appear in April, and continue to bloom until August.



THE MARSH POTENTIL.

The other is the Bog Stitchwort (*S. uliginosa*)—a smooth, slender plant, with a spreading, four-angled stem, and narrow-ovate leaves that terminate in a stiff point. In marshy or boggy ground its stems are straggling, and often near a foot in length; but on drier soils they are much shorter, and the plant more tufted. The flowers are much smaller—only about a quarter of an inch in diameter, and are arranged in loose, terminal cymes. Their petals are shorter than

the sepals, and are very deeply divided into two narrow spreading lobes. This species flowers during May and June.

The Rose family (*Rosaceæ*) includes the Purple Marsh Cinquefoil or Marsh Potentil (*Comarum palustre* or *Potentilla palustris*)—a stout plant, varying from six to eighteen inches high, the whole generally more or less tinged with purple. The flowers are of a dull purple-brown colour, in loose clusters, and bloom from May to July. The sepals, which are longer than the petals, have narrow outer segments, and longer, broad, inner segments with long, sharp points. This species is widely distributed, but is very local in the southern counties of England.



THE GOLDEN SAXIFRAGE.

In shady marshes we may often meet with one or other of the two pretty little Golden Saxifrages (order *Saxifragaceæ*), and sometimes the both growing together. One of them—the Common Golden Saxifrage (*Chrysosplenium oppositifolium*), is very abundant, often covering large patches of marsh with its golden leaves and flowers. It is a tender, succulent plant; with a decumbent stem, either simple, or branched near the top, and rooting at the base. The leaves are opposite, almost round, about half an inch in diameter, with wavy margins, and a few scattered hairs on the upper side. The lower ones are shortly

stalked, and the upper generally of a golden colour. The flowers are very small, in little, crowded, terminal clusters, surrounded by the upper leaves. They have a calyx of four spreading sepals; no petals; eight stamens joined to the base of the sepals; and an inferior ovary divided above into two conical lobes.

The other species is the Alternate-leaved Golden Saxifrage (*C. alternifolium*)—a very similar plant, but generally of a lighter colour, and its leaves are always alternately arranged. Both species have yellow flowers which bloom from April to July; and both grow to a height of from two to five inches. The latter is much less common than the former, but is very widely distributed.

The Marsh Pennywort or White Rot (*Hydrocotyle vulgaris*) is a peculiar umbelliferous plant, common in marshes and bogs, with a slender stem that creeps in the mud, rooting at every joint; and tufts of long-stalked leaves which rise above the surface of the water. The latter are round, with waved margins, about an inch in diameter, glossy, and stalked in the centre. The minute white flowers are collected into little five-flowered umbels, on stalks much shorter than those of the leaves, each individual flower having a very short pedicel, and five spreading petals. This plant flowers from May to August.



THE MARSH VALERIAN.

In the marshes of South Britain we may often meet with the pretty Marsh Valerian (*Valeriana dioica*) of the *Valerianaceæ*. It grows from six to eight inches high, and its flowers, which bloom during May and June, are of a pale rose colour, in a terminal corymb. They are mostly unisexual, the male and female flowers growing on different plants. All have a tubular corolla, pouched at the base, with five spreading lobes; but the female blooms are more

densely crowded than the males, and are of a deeper colour. The former have an inferior ovary, with a slender style and a lobed stigma; and the latter have three stamens on the corolla.

The *Gentianaceæ* is represented in bogs by the common Buckbean or Marsh Trefoil (*Menyanthes trifoliata*), the only member of its family with trifoliate leaves. This plant has a creeping stock; and its flowers, which are pink in the bud and pinkish white when expanded, are in handsome racemes on stalks from six inches to a foot in length. The calyx has five short lobes; and the bell-shaped, fleshly corolla is deeply cut into five lobes which are beautifully fringed above with delicate filaments. The time of flowering is May to July.



THE MARSH TREFOIL.



THE MARSH LOUSEWORT.

In the marshes, ditches, and wet meadows of most parts we may see the Red Rattle or Marsh Lousewort (*Pedicularis palustris*) which belongs to the order *Scrophulariaceæ*. It has an erect stem, from six to eighteen inches high, with reddish branches; and pinnate leaves with many oval segments more or less deeply cut. Its rather large crimson flowers are on very short stalks in the axils of the upper leaves, forming together a leafy raceme. The calyx is a broad, hairy tube, with two irregularly-toothed lips; and the corolla is much longer than the calyx, with two lips, the upper of which has four minute teeth. After flowering the calyx becomes much swollen; and the superior ovary ripens into a capsule with a few rather large seeds. This plant flowers from May to September.

Most wet places are characterised by the presence of

one or more species of Willows—those water-loving trees and shrubs which constitute the genus *Salix* of the order *Salicaceæ*. Some of them almost invariably establish themselves along the banks of rivers and streams, and may often be seen in long tortuous lines which mark the positions and courses of streams that no longer exist; while others thrive best in the standing water and sodden soils of marshes and bogs. One species in particular, the Osier, is largely cultivated for its long, slender twigs, so useful in the manufacture of baskets and other wicker-work; but two or three others are valued for the same purpose, and are either specially cultivated, or pollarded with the object of securing suitable twigs for this work.



THE YELLOW FLAG.

Nearly all the species have very narrow leaves, with prominent stipules at the base; and their flowers grow in erect or horizontal catkins with undivided scales. The flowers are always unisexual, the male and female blossoms being produced on separate trees. The former have from two to five stamens; and the latter a one-celled ovary that ripens to a capsule containing many seeds, each with a tuft of silky hairs. A few of these trees are common in marshes and bogs, but they are so similar in their general

features that the identification of species is somewhat difficult for a beginner.

Some of our marshes and boggy pools are beautifully decorated from May to July by the large, bright flowers of the Yellow Iris or Flag (*Iris Pseudacorus*), which belongs to the order *Iridaceæ*. This plant has a thick rhizome which creeps horizontally below the ground, and a round stem from one to three feet high. Two or three flowers grow on the stem, each with a sheathing bract at the base of its stalk. The perianth consists of six segments, the outer three broadly ovate at the top, and spreading; and the inner three narrower, shorter, and erect. There are three stamens; and an inferior ovary with three large petal-like stigmas, longer than the inner segments of the perianth, divided into two at the tip. The fruit is a large capsule, two or three inches long, containing many brownish-yellow seeds.

X

WOODS AND THICKETS IN SUMMER

A large number of the flowers that grow in woods bloom early in the spring, before the buds of the trees have expanded, or, at least, before the foliage is sufficiently dense to cover the ground with its

shadow. Some, however, are not so dependent on the direct rays of the sun, but thrive even better in the shaded, moist atmosphere of wooded ground. Others there are which seem grateful for the warm rays of the summer sun, but grow to their greatest luxuriance in the moist and partially-shaded ground of underwood and thicket, trusting to the rigidity of their own erect stems, or to the climbing habit which they have acquired, to bring their leaves and blossoms in full view of the sun during some part of the day.

Plants such as these are selected for description in this chapter; and although we may speak of their flowers as the summer blossoms of woods, thickets and copses, we must be prepared to meet with several of them outside these habitats, particularly in damp places that are more or less protected from the heat of the sun.

Our first in this series is the Lime Tree (*Tilia europæa*) of the order *Tiliaceæ*, which grows wild in many of our woods, but has been planted to such an extent that it may be found in almost every cultivated district except in the extreme North. Its leaves are stalked, alternate, heart-shaped or broadly ovate, very pointed, serrate, smooth above, and slightly downy below. The flowers, which appear during June and July, are of a pale yellowish green colour, and are arranged in cymes, on axillary, drooping peduncles that are attached for nearly half their length to a long, leafy bract. There are five sepals, which fall early; five petals; and many stamens that are united at their bases into clusters. The blossoms have a very sweet scent, and produce such an abundance of nectar that they are very attractive to bees and other insects. The fruit is a

woody nut, globular or more or less angled, five-celled, with two seeds in each cell.


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Plate II.

FLOWERS OF THI

1. Great Valerian.
2. Foxglove.
3. Succory-leaved Hawk's-beard.
4. Nettle-leaved Bell-flower.
5. Broad-leaved Helleborine.
6. Hairy Brome-grass.

A small-leaved variety, sometimes regarded as a distinct species (*Tilia parvifolia*), has a thin, angular fruit; and another, known as *Tilia grandifolia*, has very large, broad leaves, downy on both sides, and a downy fruit with from three to five prominent ribs.



THE LARGE-FLOWERED ST. JOHN'S WORT.

Several species of St. John's-wort (order *Hypericaceæ*) grow in thickets and other wooded spots. They vary considerably in size, as well as in general appearance, but all agree in the following features: Their leaves are opposite, entire, without stipules, and either sessile or very shortly stalked. The flowers are regular, with five sepals; five petals, often oblique at the tip; numerous stamens, united or clustered into three or five sets; and a superior ovary that ripens to a capsule with many seeds. No less than four species of the genus (*Hypericum*) come within the province of the present chapter. They are: —

1. The Tutsan (*H. Androsæmum*).—An erect, shrubby

plant, from one to three feet high, flowering from June to August, common in the thickets of most of the western and southern counties of Britain. It has several erect, slightly-flattened stems; and large, blunt, ovate leaves, two or three inches long, with very small, transparent dots that are easily seen when the leaves are held up to the light. The flowers are yellow, about three-quarters of an inch in diameter, and form a compact, terminal corymb. The sepals are broad, about a third of an inch long; the petals a little longer, and oblique; and the stamens are in five sets, connected at the base.



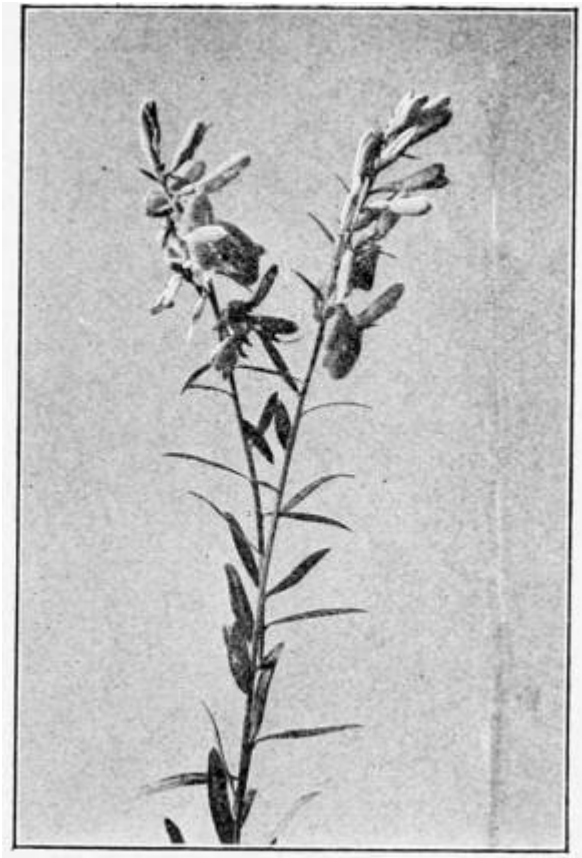
THE COMMON ST. JOHN'S WORT.

2. The Large-flowered St. John's-Wort or Rose of Sharon (*H. calycinum*).—A shrubby plant, from ten to eighteen inches high, with a creeping, woody stock, flowering from July to September. It is not indigenous, but has been largely introduced into parks and gardens, and now grows wild in many parts. This species may be distinguished from all other members of the genus by its large, yellow

flowers, from one and a half to three inches in diameter.

3. The Common St. John's-Wort (*H. perforatum*).—A very common plant in woods and thickets, growing from one to two feet high, and flowering from July to September. It has short, underground stems, or barren shoots that lie on the ground and root at the nodes, in addition to the erect, flowering stems, which are either round or two-edged, and branched towards the top. The leaves are half an inch long, with opaque veins, many transparent dots, and sometimes a few black dots on the under side. The yellow flowers form a terminal corymb. Their sepals are narrow, about half the length of the petals. The stamens are in three sets, united at the base; and both petals and anthers are marked with black dots.

4. The Hairy St. John's-Wort (*H. hirsutum*).—A stiff, erect plant, from one to three feet high, common in the woods and thickets of most parts of Britain, flowering in July and August. The stem is round, and clothed with soft hairs. The leaves are ovate, oblong or elliptical, tapering at the base into a short stalk, about an inch long, with many transparent dots, and downy along the veins on the under side. The sepals are narrow, acute, about half the length of the yellow petals, and fringed with stalked glands. The stamens are in three sets.



THE DYER'S GREEN-WEED.

The Wood Crane's-bill (*Geranium sylvaticum*—order *Geraniaceæ*), one of the most handsome of our Wild Geraniums, is not found in the South, but is moderately common in parts of North Britain, including North Ireland. Its stem is erect, from one to two feet high, and branched towards the top. In general form the leaves are heart-shaped or shield-shaped, but they are very deeply divided into five or seven radiating, cut, and toothed lobes. The lower ones are on long stalks; but the upper are shortly

stalked or sessile, and less divided. The flowers are of a bluish-purple or rose colour, about an inch in diameter, arranged in a loose panicle with two flowers on each pedicel. The five sepals are about half the length of the petals, and terminate in a very fine point; and the petals are obovate and slightly notched. The plant flowers during June and July.

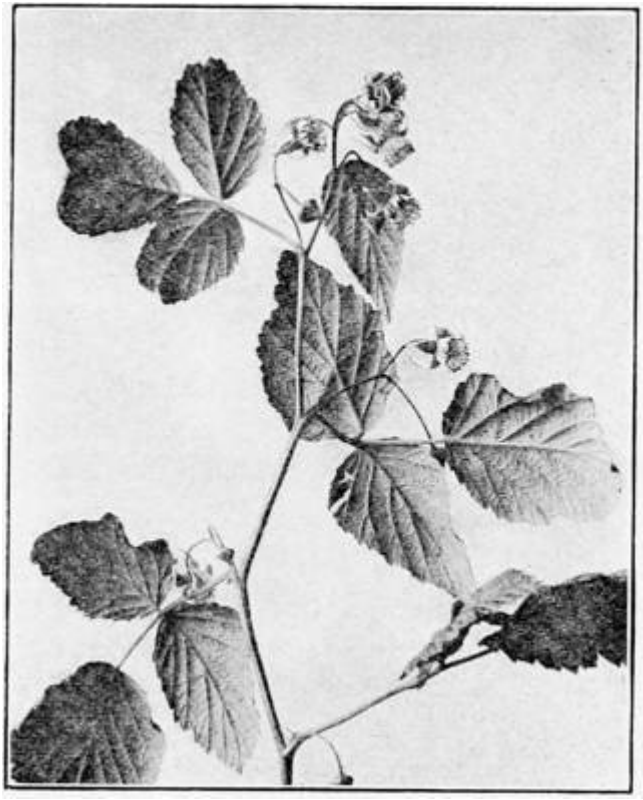


THE SWEET MILK VETCH.

Passing now to the order *Leguminosæ* we note first the Dyer's Green-weed (*Genista tinctoria*)—a shrubby plant, common in the thickets and bushy places of

South Britain, flowering from July to September. The stem is woody and stiff, but green; its base rests on the ground, but it sends up erect flowering branches from one to two feet high. The yellow flowers are arranged in terminal racemes, each flower having a lanceolate bract at the base of its short stalk, and very small bracts at the base of the calyx. The calyx has five teeth, the three lower ones much narrower than the other two, all terminating in a sharp point; the corolla is much longer than the calyx, with an oblong standard or upper petal; the stamens are all united by their filaments, forming a complete sheath round the ovary; and the pods are smooth, about an inch long, and compressed.

In the thickets of most parts of Britain, but more especially those of the eastern counties, we may often meet with the Sweet Milk Vetch (*Astragalus glycyphyllos*) of the same order. It is a prostrate plant, with pale yellow or cream-coloured flowers that bloom from June to August. The flowers are about half an inch long, in short, dense, shortly-stalked racemes. The calyx has five teeth; the upper stamen is free from the other nine, which form a divided sheath round the ovary; and the pod is smooth, round, curved, over an inch long, and divided by a double membrane into two cells, each of which contains about seven seeds.



The Wild Raspberry

In the same order are two species of Everlasting Pea (*Lathyrus*), both of which grow in thickets and other bushy places. One is the Tuberous Everlasting Pea or Tuberous Bitter Vetch (*L. macrorrhizus*), an erect plant, from six inches to a foot in height, flowering from May to July. Its rootstock has small tubers, and the stem is winged. The leaves are pinnate, with from two to four pairs of narrow leaflets and half arrow-shaped stipules; they have no tendrils, but the leafstalk terminates in a fine point. The flowers are of a red-purple colour, changing to greenish blue as they fade; and are in loose racemes of from two to

four.

The other is the Narrow-leaved Everlasting Pea (*L. sylvestris*), a straggling plant, from two to six feet long, flowering from June to August. It is not so common as the last, but may be found in similar situations. Its stem has very narrow wings; and the leaves have very narrow leaflets, flattened stalks, branched tendrils, and half arrow-shaped stipules. The flowers are rather large, of a pale purple colour, with a greenish keel, and a green spot on the large upper petal. They are arranged in loose racemes.



THE ROSE BAY WILLOW HERB.

The Wild Raspberry (*Rubus Idæus*—order *Rosaceæ*) is to be found in the woods and thickets of most parts of Britain. It may be easily distinguished from other species of its genus by the following description:—Rootstock creeping, with many suckers. Stems round, erect, with a soft down and numerous weak prickles. Leaves pinnate, with three or five ovate, pointed, toothed leaflets, pale green above, and white and hoary beneath. Stipules small, very narrow and pointed, usually attached part way up to the leafstalk. Flowers white, in long, terminal, drooping panicles. Calyx five-lobed; petals five, short and narrow; stamens numerous; and fruit consisting of a globular cluster of red or yellow, hoary, one-seeded, succulent carpels which usually separate from the conical receptacle when ripe. The bush grows from three to five feet high, and flowers from June to August.

Two species of Willow Herb (order *Onagraceæ*) grow in copses and thickets, and are easily recognised by their rose-coloured flowers with very long, inferior ovaries. One is the beautiful French Willow or Rose Bay Willow Herb (*Epilobium angustifolium*), an erect plant, varying from two to six feet in height, widely distributed, though not very common, flowering during July and August. Its leaves are alternate, narrow-elliptical, entire or with very small teeth, and very shortly stalked. The flowers are about an inch in diameter, numerous, forming a very long, loose, terminal, tapering raceme, with a narrow bract at the base of each pedicel. The calyx is tubular, four-cleft, attached to the top of the long ovary; the corolla consists of four entire, nearly equal, spreading petals; the stamens, eight in number, all bend downwards;

and the stigma is deeply divided into four lobes, on a long style which also bends downward. The fruit is a four-celled capsule, two or three inches long, which splits when ripe, its valves curling downwards and exposing numerous minute seeds, each of which has a silky tuft of fine hairs that enables it to be dispersed by the wind. The plant is most frequently seen in damp copses, and among the undergrowth of damp woods.



THE DOGWOOD.

The second species is the Pale Smooth-leaved Willow Herb (*E. roseum*), an erect plant, seldom more than

two feet high, found principally in the damp copses of the southern counties, flowering in July and August. Its stem is four-angled, two opposite angles being much more prominent than the other two; and its leaves are opposite, with longer stalks, lanceolate or elliptical, pointed, toothed, smooth, usually about two inches long. The flowers are not nearly so numerous as those of the last species, are only a little over a third of an inch in diameter, and in a short, leafy panicle, drooping while in the bud. The calyx is deeply divided into four sepals about a sixth of an inch long; the corolla consists of four notched petals, a little longer than the sepals; the stamens, ovary, fruit, and seeds correspond in number and character with those of the last species; but the stigma is either entire or divided into four very short lobes.

In the same order we have the Enchanter's Nightshade (*Circœa lutetiana*), distinguished at once from the Willow Herbs by having only two sepals, two petals, and two stamens. It is an erect, hairy plant, from one to two feet high, flowering from June to August. Its stem is slender; and the leaves are opposite, long-stalked, ovate and coarsely toothed. The flowers are very small, white, in terminal, leafless racemes, with deeply-notched petals, and pink stamens. The fruit is a little two-lobed capsule with stiff, hooked hairs.

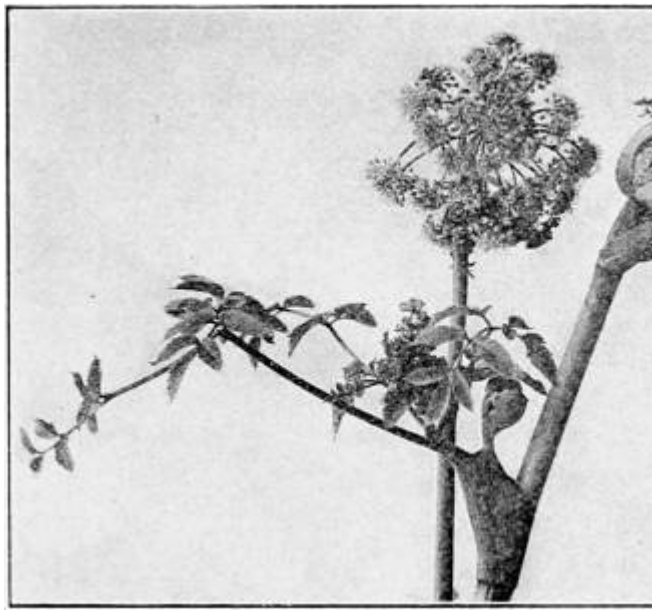


THE WOOD SANICLE.

The Cornel or Dogwood (*Cornus sanguinea*), of the order *Cornaceæ*, is a common shrub in woods and thickets, and is often employed in the making of hedgerows. It grows from five to eight feet high, and flowers during June and July. Its leaves are covered, when young, with fine, silky hairs that lie close on the surface, but these almost entirely disappear later; and towards the end of the summer the leaves assume a deep crimson or purple colour. The flowers are very abundant, of a yellowish white colour, and

are arranged in dense cymes, about two inches across, without bracts. The four-toothed calyx and the peduncle are both clothed with a mealy down; and the four petals, about a quarter of an inch long, are narrow and pointed. The fruit is a purple-black, globular, berry-like drupe, containing a stone with one or two seeds.

In very dense woods, where the light is so much reduced that but few flowers will grow, we may generally find the Wood Sanicle (*Sanicula europæa*), a smooth umbelliferous plant with a short, hard rootstock, and a simple stem from one to two feet high. The leaves, which are all radical, are on long stalks, and are palmately divided into three or five shining lobes that are themselves cut and sharply toothed. The flowers are sessile, in little rounded heads; the whole inflorescence forming an irregular umbel or a loose panicle. They are very minute, of a pinkish white colour; and the outer ones of each head usually have no pistil. They bloom during June and July, and are followed later by little prickly fruits about a sixth of an inch long.



THE ALEXANDERS.

In damp woods we commonly meet with the tall, stout, branching Angelica (*Angelica sylvestris*) of the same order (*Umbelliferæ*), with a thick, furrowed stem, two to four feet high, downy above, and usually more or less shaded with purple. Its lower leaves are very large, with stalked, ovate leaflets, from one to two inches long, often three-lobed, and always sharply toothed. The upper leaves are much smaller, with fewer leaflets, and often consist only of a broad sheath with a few small leaflets at its summit. The flowers are white, generally tinged with pink, and form a large terminal umbel of from sixteen to forty rays, with two or three narrow primary bracts, and several fine secondary ones. They bloom during July and August, and are succeeded by flattened fruits with three ribs on the back of each of the two carpels. The carpels are also

broadly winged; and, as the wings do not adhere, each fruit is surrounded by a double wing.



THE ELDER.

The order *Caprifoliaceæ* includes the Common Elder (*Sambucus nigra*), the white or cream-coloured flowers of which are so conspicuous in our woods and hedgerows in June. This tree grows to a height of fifteen or twenty feet, and its young branches are remarkable for the large quantity of pith they contain. The general form of the leaves and the arrangement of the flowers are seen in our illustration. Each flower has a calyx with five small teeth; a corolla with a short tube and five spreading limbs; five stamens attached to the base of the corolla; and an inferior ovary. The fruit is a black, berry-like drupe containing (usually) eight little,

seedlike stones.



THE GUELDER ROSE.

The Guelder Rose or Water Elder (*Viburnum Opulus*), of the same order, is a flowering shrub, usually six or eight feet high, moderately common in moist woods and copses, especially in the South, bearing showy cymes of white blossoms in June and July. The cymes are flat-topped, consisting of numerous flowers, the outer of which are much larger, often nearly an inch in diameter, but without stamens or styles, while the others are perfect, with five stamens and three sessile styles. The fruit is a blackish-red, almost globular, slightly-flattened berry, containing a single seed. The cultivated variety of this shrub,

known as the Snowball Tree, has large, globular cymes of flowers, all of which are large and barren.

The Great Valerian or All-heal (*Valeriana officinalis*—order *Valerianaceæ*) is moderately common in moist woods, and is rather widely distributed. It is an erect plant, from two to four feet high, flowering from June to August. There seems to be two distinct varieties of this plant, one with from four to six pairs of leaflets, and the other with from six to ten pairs, in addition to the terminal leaflet in each case. The flowers are small, flesh-coloured or nearly white, in terminal and axillary corymbs. The little inferior ovary is surmounted by a calyx which is compactly rolled in at first, but which expands into a spreading, feathery pappus as the fruit ripens. The corolla is tubular, with five short, equal, spreading lobes. It is not spurred as in the case of the Red Valerian (p. 302), but the base of the tube is pouched on one side. This plant is shown on Plate II, Fig. 1.

We have now to note some composite flowers (order *Compositæ*) of wooded and shaded ground. Of these we will first take the Blunt-leaved or Succory-leaved Hawk's-beard (*Crepis succisæfolia* or *C. hieracoides*), which is moderately common in the woods of North England and Scotland, but does not occur in the South. It is an erect plant, varying from one to three feet in height, smooth or slightly hairy, flowering during July and August. The fruits (achenes) are marked by many fine, longitudinal ridges, and are surmounted by a dense pappus of soft, white hairs which are a little longer than the fruits themselves. This flower is represented in Plate II, Fig. 3.

In the woods and thickets of nearly all parts of Britain we may see the Saw-wort (*Serratula tinctoria*), a stiff, erect, smooth plant, from one to three feet

high, flowering in August and September. The flower-heads are purple or crimson, forming a loose, terminal corymb; and the florets, all of which are tubular, are imperfect, the males and females being generally on different plants. The involucre is oblong in form, more than half an inch long, consisting of many pointed, closely-placed bracts, of which the inner are usually tipped with red; and that of the male heads is somewhat broader than the involucre of the females. The pappus consists of a tuft of simple hairs, most of which are longer than the achene.

The Golden Rod (*Solidago Virga-aurea*) is another abundant flower, found in dry woods and thickets in all parts. It is a tufted plant, with stiff, erect, angular, slightly-branched stems, varying from six inches to two feet in height; and narrow-elliptical leaves, entire or slightly toothed, the lower ones stalked. The flowers are very numerous, of a bright golden yellow-colour, forming a dense, terminal panicle. The heads are not large, and each consists of about twenty tubular disc-florets; half the number of strap-shaped ray-florets; and an involucre of many overlapping bracts. The pappus consists of many simple hairs. This species flowers from July to September.

Two species of Leopard's Bane (*Doronicum*) are occasionally to be seen in damp woods and thickets, especially near villages. They are not indigenous, only occurring as escapes from gardens, but they have now become well established as wild flowers in many parts of Britain. Both are tall, erect plants, from two to three feet high, with large yellow heads surrounded by two or three rows of narrow, acute bracts. Except in colour the heads much resemble the

Ox-eye Daisy. In both species the achenes of the ray have no pappus, but those of the disc have a pappus of stiff hairs in several rows. They flower from May to July.



THE SAW-WORT.

The Great Leopard's Bane (*D. Pardalianches*) has a

creeping rootstock and a hollow stem. Its radical leaves are broadly heart-shaped, slightly toothed, on long stalks; and the stem leaves are narrower, entire or toothed, the upper ones small, sessile, embracing the stem; and the lower ones stalked, with a broad expansion at the base of the stalk which clasps the stem. The heads are usually three or four in number, on long leafless peduncles.

The other species, the Plantain-leaved Leopard's Bane (*D. plantagineum*), has, as its name denotes, leaves similar to those of the Plantain. It usually has solitary flower-heads, and is represented on Plate I.

Passing now to the favourite Bell-flowers (Order *Campanulaceæ*), we have to notice four species that are to be found in woods and other shady spots during the summer months. The features common to the four species are:—Leaves alternate. Calyx adhering to the ovary, with a border of five lobes or teeth. Corolla bell-shaped, with five lobes. Stamens five, attached to the corolla by the broad bases of the filaments. Ovary inferior, ripening to a capsule that opens by longitudinal clefts. The species referred to are:

1. The Giant Bell-flower (*Campanula latifolia*). A stout plant, from three to five feet high; with an unbranched, leafy stem; and a leafy raceme of large, deep blue or white flowers that bloom in July and August. Its leaves are large, ovate to lanceolate, acute, doubly serrate, the lower ones stalked and the upper sessile. Each axillary peduncle bears only one flower, the calyx of which has long, narrow segments, and the corolla is hairy within. The capsule is short, opening by slits near the base. This flower is found principally in the North.

2. The Creeping Bell-flower (*C. Rapunculoides*).—A

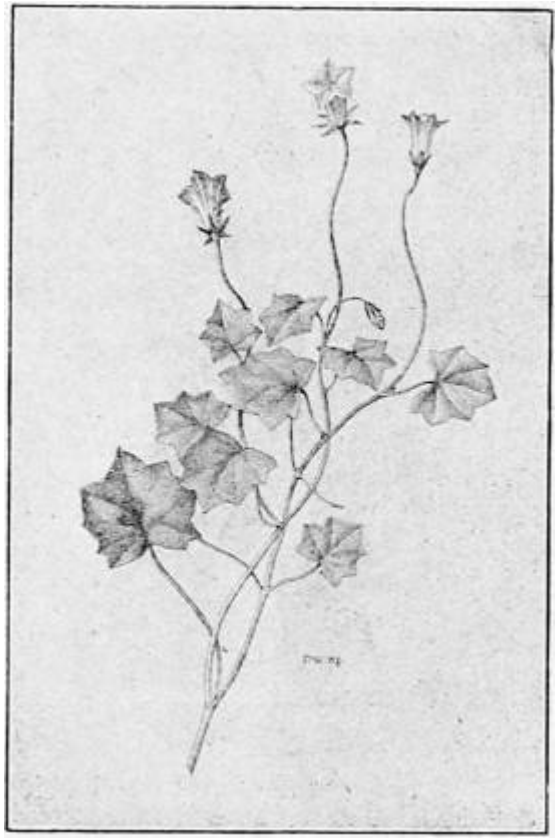
downy plant, with a creeping rootstock; an erect, simple or slightly-branched stem from one to two feet high; and a one-sided raceme of drooping, deep blue flowers that appear in July and August. The leaves are rough and doubly toothed, the lower ones stalked and heart-shaped, and the upper narrow and sessile. The segments of the calyx are long and narrow, and the capsule is globular, opening by small slits near the base. This species is widely distributed, but not very common.

3. The Nettle-leaved Bell-flower (*C. Trachelium*).—A very rough plant, with an angled stem, from one to three feet high, bearing a leafy raceme of large blue flowers from July to October. Its leaves are much like those of the Stinging Nettle, being very rough, bristly, and coarsely toothed. The segments of the calyx are rather broad, and very rough with stiff hairs. This species is very abundant in some localities, and is widely distributed. (See Plate II, Fig. 4.)

4. The Ivy-leaved Bell-flower (*C. hederacea*).—A pretty little creeping plant that grows in moist woods, flowering during July and August. It is very widely distributed, and is a common flower in many parts of Great Britain, more especially in the southern counties. Its prostrate stem is very slender; and the leaves are small, stalked, very broad, and palmately divided into angular lobes. The flowers are of a pale blue colour, solitary on long, threadlike peduncles; and the capsule is globular, opening by three valves at the top.

From May to August is the best season to study the Holly (*Ilex aquifolium*—order *Aquifoliaceæ*). We are all acquainted with this tree in its winter condition, with its bright red or yellow 'berries,' but during the

months above named the less familiar flowers are in bloom. The tree is common in the woods of all parts of Britain, and is easily distinguished at all times by its smooth, grey bark, as well as by its thick, glossy, spiny, evergreen leaves, which are placed alternately on the branches, attached by very short stalks. As a rule the leaves have waved margins, and are armed with several very strong spines; but commonly the spines of the upper leaves are much fewer, and are sometimes reduced to a single one at the apex. The little white flowers form dense clusters in the axils of the leaves. Generally they contain both stamens and pistil, but often they are imperfect, the pistillate flowers predominating on some trees and the staminate ones on others. Their parts are arranged in fours, the calyx having four small teeth, and the corolla four spreading lobes, while four stamens are attached to the latter, and the ovary has the same number of cells, and the style terminates in an equal number of small stigmas. The fruits are not really berries, but little, poisonous drupes containing four one-seeded stones.



THE IVY-LEAVED BELL FLOWER.

The Privet (*Ligustrum vulgare*), which forms, together with the Ash, the whole of the order *Oleaceæ*, as far as British species are concerned, is very common in the southern counties, where it is often an escape from gardens, the bush being so largely employed in the formation of hedges; but it is truly wild, and very plentiful on the chalky soils of the south and east of England. Except during very severe winters the old leaves remain until the early spring leaves are well formed, so that the bush is always green. The flowers

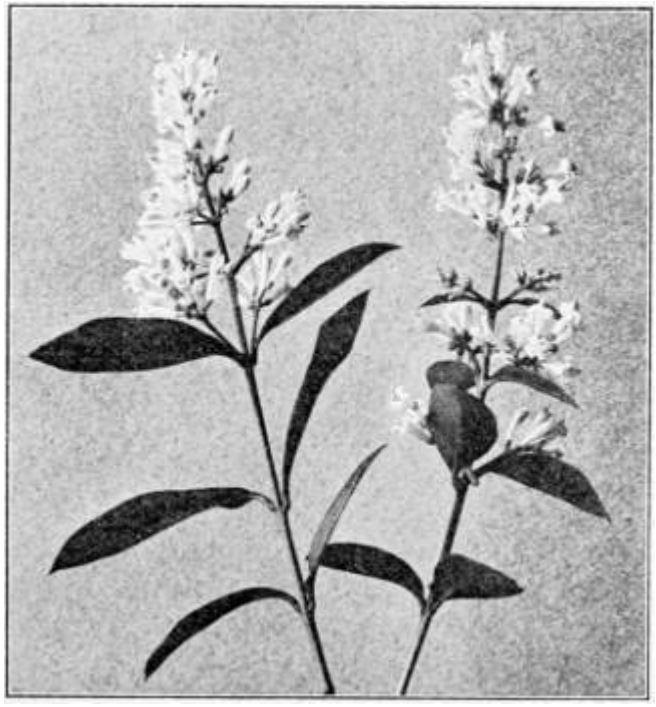
are white, with a very characteristic odour, and are arranged in dense, terminal, conical panicles. The calyx forms a little cup with four teeth, but soon falls; and the corolla is funnel-shaped, with four spreading lobes at the top of its tube. The stamens are short, attached to the corolla; and the superior ovary ripens to a black, globular berry containing two or four seeds. The bushes are in bloom during June and July.



TWO TWIGS OF HOLLY
One from a lower, and one from the topmost branch of the same tre
former in fruit.

Three species of Cow Wheat (*Melampyrum*) are to be found in copses and woods during the summer. They belong to the order *Scrophulariaceæ*; and, like other allied plants of this group, are partial parasites (See page 349), deriving a portion of their food from the roots of grasses by means of suckers. They have the following features in common:—Leaves opposite. Calyx tubular, with four narrow teeth. Corolla much longer than the calyx, consisting of a very long tube and two lips, the upper lip undivided, with its sides turned back, and the lower with three spreading lobes. A kind of 'palate' also closes the mouth of the tube. The fruit is an ovate capsule, containing from one to four seeds. The three species referred to are:—

1. The Common Cow Wheat (*M. pratense*).—A smooth, erect plant, from six to eighteen inches high, with spreading, opposite branches; and sessile, narrow leaves, often coarsely toothed at the base. The flowers are pale yellow, over half an inch long, arranged in pairs in the axils of the upper leaves, and all turned towards one side of the stem. The corolla is three or four times the length of the calyx. This plant is very common in moist copses and thickets, and flowers from June to August.



THE PRIVET.

2. The Crested Cow Wheat (*M. cristatum*).—A widely-distributed plant, found principally in the copses and thickets of the eastern and southern counties. Its stem is from six to twenty inches in height; and the leaves are very narrow, and generally entire except in the case of a few of the upper ones, which are slightly toothed at the base. The flowers are yellow, more or less variegated with purple, about half an inch long, and they closely overlap one another in a dense, four-sided spike over an inch in length. Under each flower is a broad, heart-shaped, strongly-toothed, rose-coloured bract. The plant blooms during July.

3. The Wood or Yellow Cow Wheat (*M. sylvaticum*),

sometimes known as the Small-flowered Cow Wheat. This is a much rarer plant, and seems to be found only in the hilly woods of Scotland and North England. It is very much like the Common Cow Wheat, but its flowers are of a deep yellow colour, less than half an inch long, with entire bracts, and equal, open lips. The corolla is only twice the length of the calyx, and the lanceolate leaves are very seldom toothed.



MILLET GRASS.



Bearded Wheat.

The same order (*Scrophulariaceæ*) contains the handsome and favourite Foxglove (*Digitalis purpurea*), which grows abundantly in most dry woods and shady wastes, flowering from June to August. Its stout, unbranched stem varies from two to six feet in height, a large proportion being the axis of a long one-sided raceme of beautiful, drooping, purple or, occasionally, white flowers. The fruit is an ovate, pointed capsule that splits into two valves and contains many seeds. It is remarkable that this plant does not grow freely on chalk and limestone soils, yet it will often make a sudden appearance in great profusion as we pass over the edge of a calcareous district. The flower is shown on Plate II, Fig. 2.

Of the order *Labiatæ* we shall note one species only, and that is the pretty Wood Betony (*Stachys Betonica*), a very common plant in the woods and thickets of the south of Britain. It is a hairy species, with a slender, simple or slightly-branched stem from one to two feet high; and deeply-crenate, oblong leaves. The lower leaves have long stalks, and are heart-shaped at the base; but those of the stem are narrower, sessile or shortly stalked, tapering at the base. The flowers, which bloom from June to August, vary much in colour, ranging from a deep purple or crimson to a rose-pink or (rarely) white; and they form a dense oblong, terminal spike, consisting of whorls of six or more, with a bract at the base of each calyx, and a pair of sessile leaves just below the lowest whorl. The calyx is ribbed, with five very sharp teeth; and the corolla, which is much longer than the sepals, has an erect, oval, upper lip, and a spreading, three-lobed, lower lip. The stamens are in two pairs, immediately under the upper lip; and the fruit consists of four little rounded nuts.



Slender False Brome.

In the dry woods of South Britain we occasionally meet with the Wood Scorpion-grass or Wood Forget-me-not (*Myosotis sylvatica*), of the order *Boraginaceæ*.

This plant is very much like the favourite Water Forget-me-not, and has equally large flowers, but it is much more hairy. Its stem is erect, without runners; and the blue flowers form a one-sided raceme without bracts. As the flowers expand the stalk lengthens considerably, with the result that the fruits are very distant. Among other features by which we may distinguish between the Wood Forget-me-not and the commoner Water Forget-me-not we may mention that the corolla of the former is flatter; and the calyx, cleft to its base into narrow segments, is very rounded below, and covered with stiff, hooked bristles. The plant flowers from June to August.

We conclude this chapter with the names of four species of Grasses that are partial to wooded districts, and which flower during the summer months. They are the Millet Grass (*Milium effusum*), the Bearded Wheat (*Triticum caninum*), the Slender False Brome (*Brachypodium sylvaticum*), and the Hairy Brome Grass (*Bromus asper*). The first three of these are represented on pages 148 and 149, and the fourth is shown on Plate II.


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1.

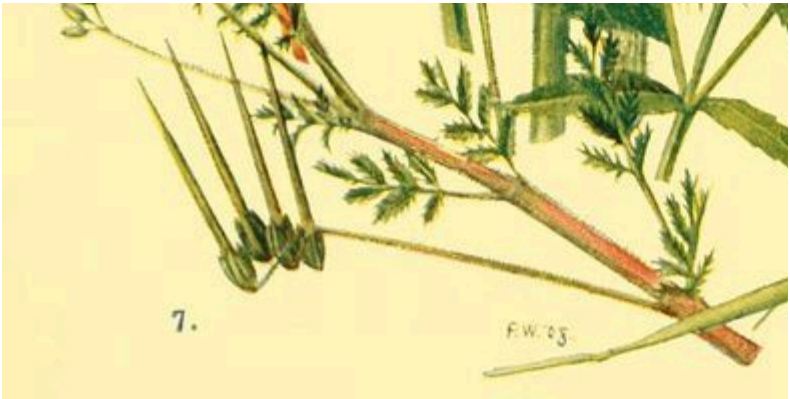


Plate III.

FLOWERS OF

1. Round-leaved Crane's-bill.
2. Black Horehound.
3. Evergreen Alkanet.
4. Bristly Ox-tongue.
5. Red Bartsia.
6. Annual Meadow Grass.
7. Hemlock Stork's-bill.

XI

WASTES AND WAYSIDES IN SUMMER

It will probably have been noticed that several of the spring flowers of our waysides and waste places continue to bloom into the summer. Descriptions of

these will, of course, not be repeated here, but, for the convenience of those who are endeavouring to identify flowers which have been gathered during the summer months, we append a list of the species referred to:

Plants of the Wayside and Waste Ground that bloom during both Spring and Summer

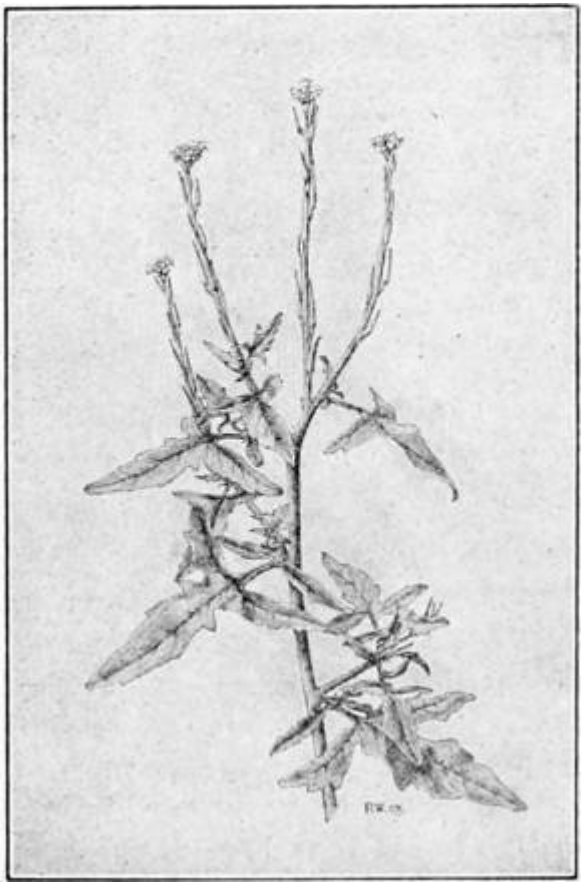
Greater Celandine.
Shepherd's Purse.
Yellow Rocket.
Early Winter Cress.
Thale Cress.
Wild Turnip.
Procumbent Pearlwort.
Lesser Stitchwort.
Mouse-ear Chickweed.
Dove's-foot Crane's-bill.
Jagged-leaved Crane's-bill.
Herb Robert.
Black Medick.
Bird's-foot.
Bush Vetch.
Chervil.
Mouse-ear Hawkweed.
Groundsel.
Common Speedwell.
Wall Speedwell.
Field Speedwell.
Gray Field Speedwell.
White Dead Nettle.
Red Dead Nettle.
Cut-leaved Dead Nettle.
Yellow Pimpernel.
Annual Meadow Grass.

The flowers described in the present chapter are those which do not, as a rule, bloom before the month of June.

Our first example is the Wild Clematis, Traveller's Joy, or Old Man's Beard (*Clematis Vitalba*), of the order *Ranunculaceæ*—a climbing shrub, very common in the hedgerows of the south and centre of England, producing a profusion of white, scented flowers during July and August, and rendered even more conspicuous in the autumn and winter by the dense clusters of feathered fruits. Its stem is woody and often very thick at the base; and the annual branches climb over the neighbouring plants, clinging by means of the twisted leafstalks. The leaves are opposite, pinnate, with three or five stalked, ovate or cordate leaflets; and the flowers are in loose, axillary or terminal panicles. The latter have four greenish-white sepals; no petals; numerous stamens; and many one-seeded carpels, each of which, when ripe, is tipped by the persistent style that has become very long and feathered.



The Wild Clematis.



THE HEDGE MUSTARD.

The Common Hedge Mustard (*Sisymbrium officinale*—order *Cruciferæ*) is a very common roadside plant, with stems and leaves so closely set with hairs that they effectually hold the dust. It bears small, yellow flowers, which appear during June and July; and it may be easily distinguished from allied plants by its long and narrow, downy, tapering pods, which lie close against the stem. Its stem grows from one to two feet high, and is freely branched.

The Felix Weed (*S. Sophia*) of the same genus is moderately common, grows to about the same height, and bears small, greenish-yellow flowers from June to August. The stem of this plant is only slightly hairy, slender, erect, and branched; and the leaves are divided in a pinnate manner, with long, narrow segments similarly cut. In this genus the sepals are longer than the petals; and the narrow, tapering fruits are constricted between the numerous seeds.

The Dyer's Weed, also known as the Dyer's Rocket and the Yellow Weed (*Reseda luteola*), is a plant of a habit similar to that of the Wild Mignonette, and belongs to the same order (*Resedaceæ*), but may be distinguished from the latter by its four sepals and four petals. It owes its popular names to the fact that it was formerly employed for the purpose of dyeing woollen fabrics. This is a common wayside plant, especially in calcareous districts, and often reaches a height of three feet, flowering during July and August.

Passing to the order *Caryophyllaceæ*, we note the Deptford Pink (*Dianthus Armeria*)—a downy plant, a foot or more in height, with an erect, slightly-branched stem; and very narrow, opposite leaves, from one to three inches long, joined together at the base, and mostly acute at the tip. The flowers, which bloom in July and August, are rose-coloured with white spots, and are grouped in terminal clusters, with a very narrow, pointed bract below each calyx, usually as long as the calyx itself. This plant is to be found principally on dry banks and on waste ground, but it is not common.



THE FELIX WEED.

The Red Campion (*Lychnis diurna*) is common on the banks of wayside ditches, as well as in copses and other moist and shady places. It has a hairy stem, from one to two feet high; hairy, ovate leaves in pairs; and red (rarely white), unisexual flowers which close at night. The male and female flowers are on separate plants. The former have ten stamens; and the latter a superior ovary which ripens to a

globular capsule with five teeth that spread horizontally or even curve downwards. In both the calyx is tubular, with five triangular teeth; and the petals have spreading, deeply-notched limbs. The plant flowers during June and July.

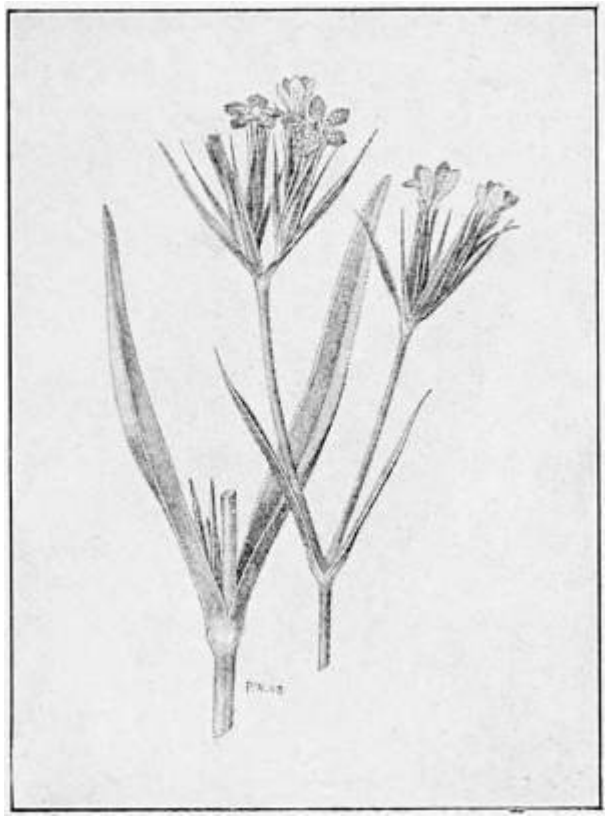


THE DYER'S WEED.

Three species of Mallow (order *Malvaceæ*) are more or less common by waysides and on waste ground. They are all interesting plants, with large, regular, attractive flowers; and stipuled leaves which are

palmately lobed and veined. The flowers have five sepals and five petals, the latter being very curiously twisted in the bud. The stamens, five in number, are freely branched, and are also raised on a tubular structure as the flower matures, so that they appear like a large number of stamens with united filaments. The ovary consists of many carpels, with as many styles; and the fruit splits into a number of one-seeded parts arranged radially.

The Common Mallow (*Malva sylvestris*) is a strong, erect, downy plant, from two to three feet high, with branched stem. The flowers are axillary, large and showy, of a pale purple or a lilac colour, marked with crimson veins; and the fruit is smooth.



THE DEPTFORD PINK.

The Dwarf Mallow (*M. rotundifolia*) is about as common, and grows in similar situations, but it is a smaller plant, with prostrate stems from six inches to a foot long. The leaves are cordate or almost round, divided into five or seven shallow, crenate lobes. The flowers are smaller than those of *M. sylvestris*, being generally less than an inch in diameter, of a pale lilac colour; and the fruit is hairy. Both species flower from June to September.

It is interesting to note that these two flowers, which frequently grow together on the same waste ground,

and consequently have to compete with one another in the general struggle for existence, are pollinated in totally different ways, the one (*M. sylvestris*) by the aid of insects, and the other (*M. rotundifolia*) probably almost always self-pollinated. In both these flowers the stamens are mounted on the top of a tube as above described; and in both the stamens are crowded round the numerous styles while the flower is yet young, so that insects which visit the flower for nectar can hardly fail to dust themselves with pollen. In *M. sylvestris*, however, the stamens are mature before the stigmas, and the former droop, thus bringing the anthers below the level of the stigmas, so that the flower could hardly fertilise itself even if anthers and stigmas matured simultaneously. But later the styles bend downwards, thus bringing the stigmas to the position of the withered stamens in order to catch the pollen brought by insects from other flowers. Further, the pollen cells of this species are covered with minute hooks by means of which they attach themselves to the hairy legs of bees.

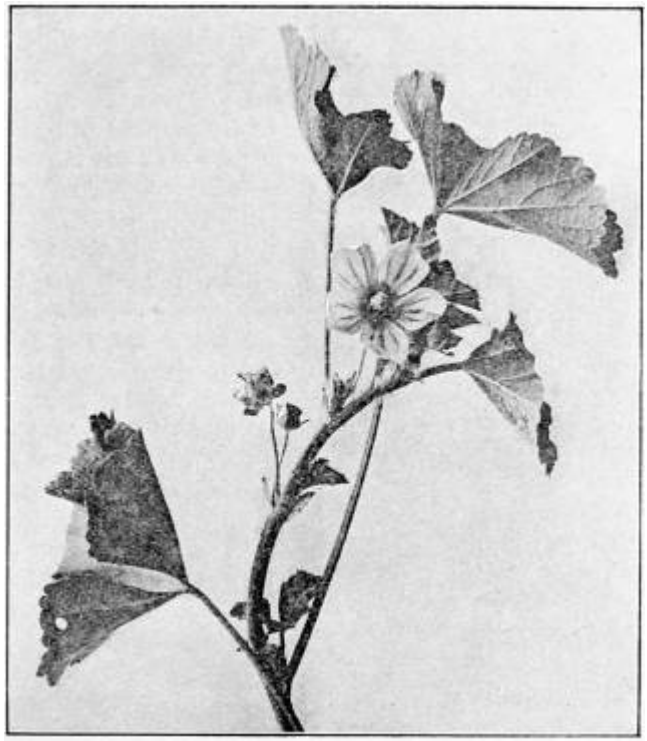


THE RED CAMPION.

The anthers and stigmas of *M. rotundifolia* are both matured together; and the styles lengthen, and bend downwards, causing the stigmas to twine themselves among the numerous stamens in such a manner that the flower can hardly fail to fertilise itself. Further, if we watch the flowers of these two species on a sunny day, we find that insects visit the flowers of *M. sylvestris* freely, while they are seldom attracted to the smaller and less conspicuous blooms of *M. rotundifolia*.

The third species referred to is the Musk Mallow (*M. moschata*), so called from the musky odour given off

from all parts of the plant, especially when rubbed or crushed. It is often seen in hedgerows, but is not so common as the other two just described, and seems to be rather partial to gravelly soils. The plant is hairy, of a pale green colour, with an erect stem from two to three feet high. The flowers are large and beautiful, of a rich rose colour, and crowded towards the top of the stem. The fruit is hairy. A white variety is occasionally seen, and this is not uncommonly grown as a garden flower. The time of flowering is July and August.



THE COMMON MALLOW.

Some three species of Geranium (order *Geraniaceæ*)

have already been described among the spring wayside flowers, and these were listed at the commencement of the present chapter as continuing to bloom during the summer; but now we have to note other interesting flowers of this and an allied genus as essentially summer bloomers.

The first of these is the Round-leaved Crane's-bill (*Geranium rotundifolium*), which rather closely resembles the Dove's-foot Crane's-bill, but is not nearly so plentiful. It is a downy plant, growing from six to twelve inches high, and flowering in June and July. The flowers are usually nearly half an inch across, of a pink colour; and the petals are *not* notched. This species is represented on Plate III, Fig. 1.

In dry pastures and on stony wastes we may see the Bloody Crane's-bill (*Geranium sanguineum*), which, though not common, is very widely distributed in Britain. It has a thick, woody stock; numerous more or less decumbent stems, from one to two feet long, clothed with spreading hairs; and round leaves, divided quite to the base into five or seven deeply-cut segments. The flowers are solitary, dark crimson (occasionally pink) in colour, with hairy sepals terminating in fine points; slightly notched petals about twice as long as the sepals; and ten stamens, five of which are larger, and glandular at the base. This species flowers during July and August.



THE MUSK MALLOW.

The Small-flowered Crane's-bill (*G. pusillum*) also resembles the Dove's-foot Crane's-bill, but its flowers are usually smaller—about a third of an inch in diameter—and of a pale lilac colour. The stems are prostrate and downy, from six to eighteen inches long; and the leaves roundish and deeply lobed. The sepals terminate in a sharp point, and the petals are notched. This is a very common species, which flowers throughout the summer.

British wild flowers of the Geranium family are

divided into two groups, known popularly as the Crane's-bills and the Stork's-bills, the former constituting the genus *Geranium*, of which several flowers have been described; and the latter forming the genus *Erodium*. These two groups are sometimes confused by young botanists, but may be easily distinguished by the aid of the following notes:—The flowers of the Crane's-bills are symmetrical, while the petals of the Stork's-bills are rather unequal in size and sometimes deficient. In the former there are ten stamens, five of which are alternately larger, as previously mentioned; while the latter have five perfect stamens, glandular at their bases, and five alternating, abortive ones. Further, in the genus *Geranium* the persistent styles are straight, while in the Stork's-bills they are twisted spirally.



THE BLOODY CRANE'S-BILL

The manner in which the seeds of Stork's-bills are dispersed is particularly interesting:—When the fruit is ripe the carpels separate, and the twisted styles are gradually released from one another, from below upwards, till the fruit is finally set free and blown away by the wind. The carpels thus detached are each furnished with a long style, the lower portion of which is coiled like a corkscrew, while the upper part is straighter but bent to one side. Now, these styles are hygroscopic—that is, they are influenced by changes in the condition of the atmosphere as regards moisture. This may easily be shown by placing the fruit in an upright position on a piece of

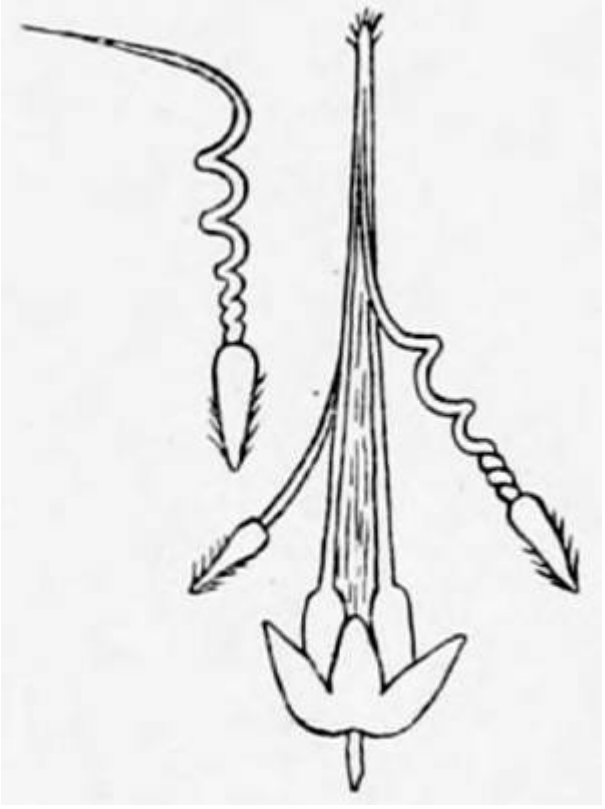
white card, and fixing it so with a little spot of glue or gum, so that the bent upper end of the style is free and serves as a little pointer. If now the open mouth be placed close over the carpel, and moist air be breathed upon it, the corkscrew will partially uncoil, causing the pointer to turn; and as the carpel dries again the pointer will resume its former position.

Again, if the carpel be placed horizontally on a sheet of rough paper (not fixed), and then alternately treated with moist and drier air, the successive uncoiling and coiling of the spiral, together with the aid of the bent tip and the hairs which give the carpel a hold, will cause it to travel along. Thus, in its natural condition, and influenced by the varying state of the atmosphere as regards moisture, the carpels of the Stork's-bill will not only travel some distance from the parent plant, but the seed end will even be thrust between the particles of soil, and the seed thus naturally buried.

There are three British Stork's-bills, of which only one may be described as common. This is the Hemlock Stork's-bill (*Erodium cicutarium*), a very variable plant as regards the form of the leaves and the size and number of flowers, often plentiful in waste places, especially near the sea. Its stems are prostrate and hairy, growing from six to eighteen inches in length; and the flowers, which may be seen throughout the summer, are rose-coloured, or, sometimes, white. The petals are not divided or notched, and they soon fall.

Passing now to the order *Leguminosæ*, we deal first with the exceedingly pretty and common Bird's-foot Trefoil (*Lotus corniculatus*), that derives its popular name from the arrangement of the cylindrical seed-pods, which spread in such a manner as to resemble

the toes of a bird. Its stems are partially prostrate; and its compound leaves are not composed of three leaflets, as the term *trefoil* suggests, but of five, two of which occupy such a position that they might be mistaken for stipules. The flowers, which bloom in July and August, are of a bright yellow or orange colour, often tinged with red. They are arranged in umbels of from three to ten, with long peduncles and short pedicels.



THE FRUIT OF THE STORK'S-BILL.

The genus *Vicia*, of the same order, includes the plants commonly known as Tares. These are climbing

plants which cling by means of tendrils at the tips of their pinnate leaves, and have their flowers in axillary clusters. Their styles are threadlike, with a ring or a tuft of downy hairs near the extremity; and the pods are flattened.

Two species may be included among our summer wayside flowers, one of which—the Hairy Tare (*Vicia hirsuta*)—is very common in fields and hedges, flowering from June to August. The stems of this plant are slender, hairy, and are so much branched that they form tangled masses, often mixed up in a confused manner with neighbouring plants. The leaves have from six to eight pairs of leaflets; and the minute, pale blue flowers, in clusters of from one to six, are on long peduncles. The pods have only two seeds, and are hairy and sessile.



THE HEMLOCK STORK'S-BILL.

The other Tare referred to is the Slender Tare (*V. tetrasperma*), found principally in the South of England. It owes its specific name to the fact that its pods usually contain four seeds. It is more slender and much less branched than the Hairy Tare, and its leaves have generally only from three to five pairs of leaflets. The flowers are pale blue, appearing from June to August, and are generally solitary or in pairs, on peduncles which are about as long as the leaves. The pods are smooth.



THE BIRD'S-FOOT TREFOIL.

The same genus includes the Tufted Vetch (*Vicia Cracca*)—a very common plant on hedgerows and bushy waysides, where it climbs over the neighbouring plants and shrubs, covering them with its dense racemes of bluish-purple flowers from June to August. Its climbing stem is very weak, but it often grows to a length of six feet or more, supporting itself by means of the branched tendrils at the tips of its leaves. The leaves are pinnate, with about ten pairs of narrow, pointed, silky leaflets, usually from half an inch to three-quarters in length; and at the base of each leaf-stalk is a pair of narrow,

half arrow-shaped stipules. The racemes are one-sided, on rather long stalks, with from ten to thirty flowers, each nearly half an inch long. The pods are smooth, flattened, about an inch long, containing from six to eight seeds.



THE HERB BENNET OR GEUM.

Of the order *Rosaceæ* we have several summer wayside flowers, our first example being the Common Avens, also called the Wood Avens and the Herb Bennet (*Geum urbanum*), which is common on banks and hedgerows. This is an erect, hairy plant,

from one to two feet high, with yellow flowers, from a half to three-quarters of an inch across, on erect stalks. The numerous carpels ripen into a head of one-seeded achenes, on each of which the persistent style forms a curved, hooked awn that readily clings to the hair or wool of animals, thus providing an effectual means by which the seeds are distributed. A variety of the Common Avens occurs with drooping flowers.



THE DOG ROSE.



THE SILVER WEED.

The Dog Rose (*Rosa canina*) is one of the prettiest and most abundant flowers of our hedgerows, and may be seen in bloom throughout June and July. The bush has a thick, woody stock; and weak, straggling stems, often reaching a height of six or eight feet, armed with equal, curved prickles. The flowers are pink or white, with a calyx consisting of a globular tube, contracted at the top, and five spreading segments; a corolla of five petals; numerous stamens; and an ovary of several one-seeded carpels with free styles. The carpels are very hairy, and are enclosed within the tube of the calyx, which becomes red and succulent as the fruit ripens; but the calyx segments usually fall before the ripening is complete.



THE AGRIMONY.

The Silver Weed (*Potentilla anserina*), of the same order, is one of the commonest of our roadside flowers, rendered more conspicuous by its pretty, silvery leaves than by its solitary, yellow flowers. It has a creeping stem, from six to twelve inches long, which bears pinnate leaves. The leaflets are deeply

serrated, and densely covered beneath (and sometimes also above) with soft, silky hairs.

Two of the Cinquefoils are very common by roadsides. These are the Hoary Cinquefoil (*Potentilla argentea*), and the Creeping Cinquefoil (*Potentilla reptans*). The first of these is a partially prostrate plant, with stem from six to eighteen inches long; and digitate leaves with five, wedge-shaped leaflets. The leaflets are rendered white beneath by woolly hairs that lie close against the surface, and their edges are curled backwards. The flowers, which bloom in June and July, are yellow, small, and clustered.

The Creeping Cinquefoil has a slender stem that creeps on the ground and forms new roots at the nodes. Its leaves are digitate and long-stalked, with five obovate, serrate, hairy leaflets. The flowers are yellow, solitary, nearly an inch in diameter, with five sepals and five petals.

On banks we frequently meet with the Agrimony (*Agrimonia Eupatoria*), a slender plant, from one to two feet high, covered with soft hairs, and bearing long, tapering, spikelike racemes of small, scattered, yellow flowers during June and July. This plant may be readily identified by means of our illustration.

One of the Willow Herbs—the Broad Smooth-leaved Willow Herb (*Epilobium montanum*)—is common on roadside banks, flowering during June and July. Its stems are slender, downy, and generally unbranched; and the leaves are opposite, stalked (the lower ones almost stalkless), ovate, acute, with serrate edges, and smooth except along the margins and the principal veins, which are more or less downy. The plant grows to a height of one or two feet, and bears small, pale-purple flowers which droop when in the

bud. It belongs to the order *Onagraceæ*; and, like the others of its genus, has four sepals, four petals, eight stamens, and a long inferior ovary which splits into four valves, setting free a large number of little, tufted seeds.

The order *Crassulaceæ* contains a number of low, succulent plants, with small, regular, star-like flowers. Some of them are well known as Stonecrops and House-leeks. Those of the Stonecrop group usually have cymes of flowers with perianth leaves in whorls of five, and stamens in two whorls.

One member of this group—the Orpine or Livelong (*Sedum Telephium*)—is not uncommonly found on shady wayside banks, especially near villages and on the outskirts of towns, where it is probably an escape from gardens. Its leaves are large, flat, oval or oblong, with serrate edges. The flowers have five sepals and five petals, are of a purple or crimson colour, and are clustered in close cymes.

We have now to consider several species of the order *Umbelliferæ*—a group of flowers which contains so many species, with often such close resemblances in general appearance, that it is always more or less puzzling to the beginner, especially as it is frequently necessary to note minute details of structure in order to determine a species.

The leading characteristic of the order is that denoted by its name; for the flowers, which are generally very small and white, are arranged in umbels. In a few instances these umbels are simple; but in most they are compound—that is, the stalks which radiate from the same point on the main peduncle, and thus form the *primary umbel*, give rise to the lesser stalks of the *secondary umbels*, which are similarly arranged and bear the flowers. There are

often bracts at the base of the primary umbel, in which case they are termed the *primary bracts*; and there are frequently *secondary bracts* or *involucels* at the bases of the secondary umbels.



THE ORPINE OR LIVELONG.

The flowers have a superior calyx; with five teeth; but this is often so inconspicuous that it appears like a mere rim round the top of the ovary. There are also five petals, which generally have their points turned inwards; and five stamens. The inferior ovary consists of two united carpels, surmounted by a

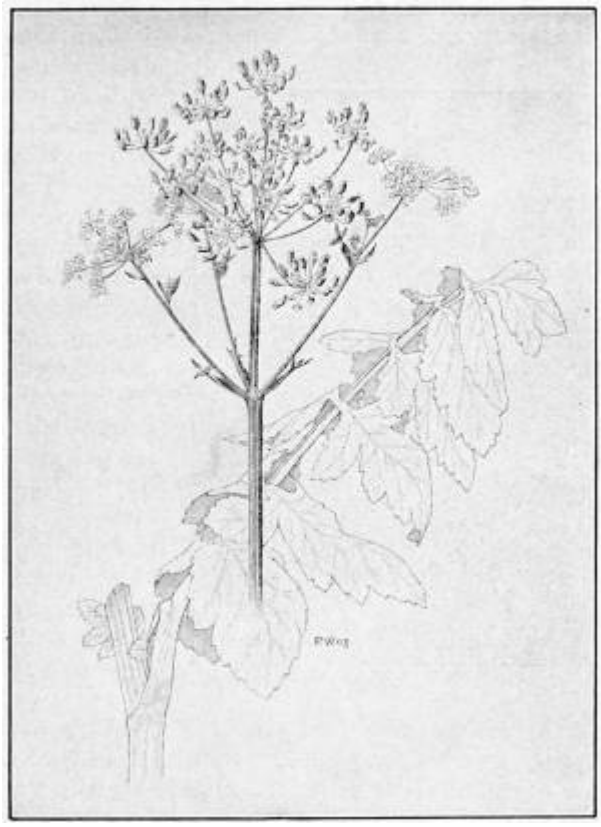
fleshy disc that supports the petals and the stamens, and bears two styles.

Special attention must be given to the structure of the fruits of umbellifers, for a close examination of these is often necessary for purposes of identification. The two carpels are close together, with their adjacent surfaces flattened, and are fixed to a central axis called the *carpophore*. As the fruit ripens, the carpophore often divides, from above downwards, becoming Y-shaped; and the carpels, thus separated, are for a time suspended on its two arms. Each carpel is marked by vertical ridges, generally nine in number, five of them (*primary ridges*) being more prominent than the four intermediate or *secondary ridges*. The ridge on each side of the carpel, nearest to the fissure that divides the fruit into two parts, is often extended so as to form wings by means of which wind-distribution is greatly facilitated; and between the various ridges are the *furrows* of the fruit. In addition to these features, there are often narrow, light-coloured streaks running parallel with the ridges, in the walls of the fruit. There are usually six of these in each carpel, sometimes more than one in the same furrow, and they mark the positions of narrow oil-sacs or *vittæ*. Each carpel contains only one seed.



THE FOOL'S PARSLEY.

As to the general characters of the plants, it may also be noted that the stems of the *Umbelliferæ* are jointed, and frequently hollow; also that the leaves are pinnately divided, and often *decompound* (compound, with compound leaflets).



THE WILD PARSNIP.

Our first example of this family is the common Hemlock (*Conium maculatum*) of hedges and waste ground—a very graceful plant, with a much-branched stem that grows from two to six or more feet in height. It is distinguished by a fœtid odour and poisonous properties. Its stem is slender in proportion to the height, furrowed, smooth, and spotted with purple or red. The flowers are white, with hardly a trace of a calyx, and arranged in compound umbels, with three small bracts *on one side* of the secondary umbels. The fruit is short,

swollen, and slightly flattened laterally; and the carpels, without vittæ, have each five thick, waved ridges. The Hemlock flowers during June and July.



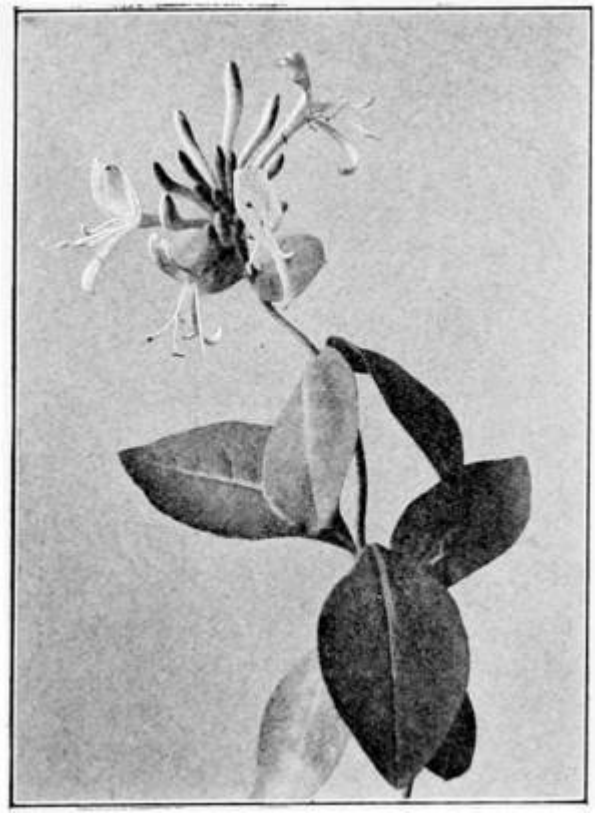
THE COW PARSNIP OR HOGWEED.

Several of the common umbelliferous plants are called the Fool's Parsley by those who are unable to distinguish between species, but this name is correctly applied only to *Æthusa cynapium*, a smooth, leafy plant, with an unpleasant odour and poisonous properties. The plant grows from a foot to eighteen inches high, flowers during July and August, and is common in cultivated ground as well as in wastes and by waysides. It may be recognised at once by the help of our illustration; but we call special attention to the three, long, drooping bracts on the outer side of each secondary umbel.

On roadside banks, particularly in chalky districts, we may often meet with the Wild Parsnip (*Pastinaca sativa*). This is an erect, downy plant, with a tap root; and angular, hollow stem from two to three feet high. Its leaves are pinnate, glossy above and downy beneath, with five or seven ovate, sessile, cut and serrate leaflets, and sheathing petioles. The umbels are terminal, without primary or secondary bracts; and the flowers are small, of a bright yellow colour, producing flattened, winged fruits. The flowers bloom during July and August.

The Cow Parsnip or Hogweed (*Heracleum Sphondylium*) is somewhat similar in general appearance, but is much stouter, and grows to a height of four or five feet. Its stem is hairy and channelled; and the leaves have a few broad, lobed, serrate leaflets with a rough, hairy surface. The flowers, which bloom during July and August, are of a reddish white colour, and have unequal petals.

The Upright Hedge Parsley (*Torilis Anthriscus* or *Caucalis Anthriscus*) is a slender plant, with an erect, solid, rough stem, from two to three feet high. Its leaves are hairy, bipinnate, with lobed and toothed, ovate or oblong leaflets. The white or pale pink flowers are arranged in long-stalked, terminal umbels of from about six to twelve rays, with several primary and secondary bracts. The fruits are armed with bristles which, though not hooked, are slightly bent inwards. This is a very common hedgerow plant, flowering from July to September.



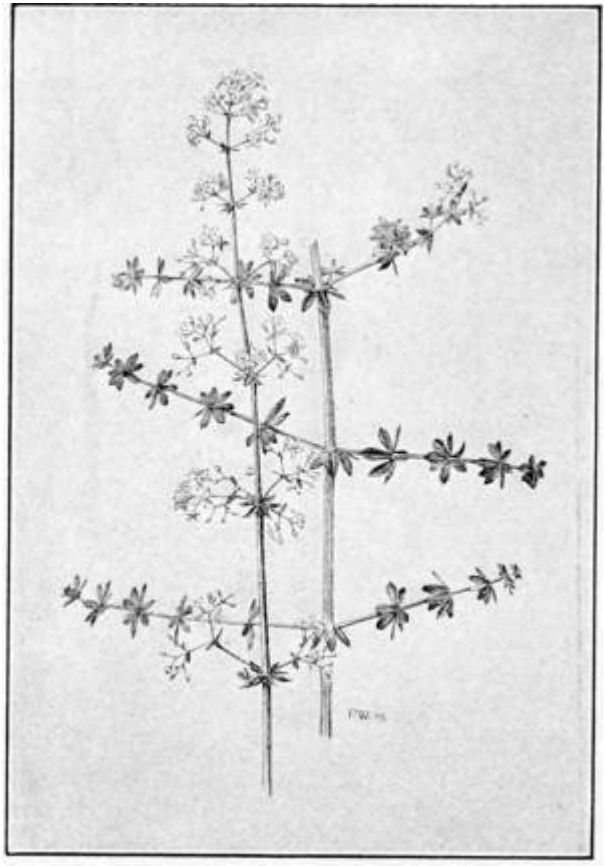
THE HONEYSUCKLE.

Our last example of the *Umbelliferæ* is the Rough Chervil (*Chærophyllum temulum*), which is very common in hedgerows, among the undergrowth of woods, and in other shady places. It has a slender stem, from one to three feet high, swollen at the joints, spotted with purple, and rendered rough by short hairs. The leaves, which are also rough and spotted, are bipinnate, with ovate leaflets that are cut into segments terminating abruptly in a sharp point; and they assume a rich purple tint that makes the plant a conspicuous object in the autumn. The

flowers are white, in terminal compound umbels which droop in the bud. The bracts are few in number or altogether absent, but there are several secondary bracts which are fringed and bent downwards.

Passing now to the order *Caprifoliaceæ*, we have to deal with the well-known and favourite Honeysuckle or Woodbine (*Lonicera periclymenum*), so highly prized on account of its lovely fragrant flowers. It is a climbing plant, often reaching a height of ten or twelve feet, supporting itself by twining its woody stem round surrounding shrubs and trees in hedges and the open spaces of woods. The beautiful flowers, which are yellow within, and more or less tinged with red outside, are arranged in terminal, stalked heads; and the united petals form widely-gaping lips. The plant blooms from June to September, and displays its crimson berries in the autumn.

Two other species of Honeysuckle occur in our hedges, but neither of these is common. One is the Upright Honeysuckle, which has an erect stem; downy, stalked leaves; and pale yellow, scentless flowers that grow in pairs in the axils of the leaves. The other is the Perfoliate Honeysuckle, so called because its upper leaves are united at their bases, with the stem running through them. In this one the flower-heads have no stalks.



THE GREAT HEDGE BEDSTRAW.

In the Bedstraw family (order *Rubiaceæ*) we have two very common, hedgerow plants—the Great Hedge Bedstraw (*Galium Mollugo*) and the Goose-grass or Cleavers (*G. Aparine*). The first is a very straggling plant, with a square stem, thickened at the joints, that often reaches a length of four or five feet. Its leaves are elliptical, with apex terminating suddenly in a bristle-like point, and margins roughened by prickles that are either at right angles or pointing more or less forward. They are arranged in whorls,

usually of eight, but sometimes six. The little white flowers, which bloom during July and August, are arranged in panicles with spreading branches, the lower of which are either horizontal or bent downward. The fruit is smooth.

The Goose Grass is so named because it is eaten by geese; and it is also known as the Cleavers because its fruits, which are covered with hooked bristles, cling tenaciously to our clothing and to the covering of animals. Its straggling stem often reaches a length of four or five feet, and forms tangled masses with the stems and leaves of other hedgerow plants. The leaves are narrow and keeled; and the small, white flowers are arranged in small axillary clusters of two or three. The whole plant is rough with hooked bristles.



THE TEASEL.

We conclude this chapter with a description of the common Teasel (*Dipsacus sylvestris*) of the order *Dipsaceæ*. This is really a very graceful plant, rarely less than three or four feet high, and sometimes reaching six feet or more. Its stem is very stout and prickly; and its large bright green leaves are simple, sessile, and arranged in opposite pairs. They are prickly beneath, and the two leaves of each pair are united at their bases in such a manner that they form hollows in which the rain-water collects. The reservoirs so formed often contain drowned insects

which have flown or fallen into the water, or which have been washed down the stem by the rain. Their dead bodies decompose, giving rise to nitrogenous and other products of decay which generally discolour the water. These products are valuable as plant food, and it has been said that they are absorbed by the leaves. The flowers of the Teasel are collected in large heads, covered with straight, stiff bristles, and have an involucre of bracts which curve upwards. The flowers are of a pale purple colour. They commence to open near the middle of the head, forming a horizontal circle; and then they expand both upwards and downwards from this level. The flowers are not conspicuous individually, nor does each individual flower produce much pollen; but the large heads of bloom attract numerous insects which climb about among the flowers in search of nectar, covering their bodies with pollen, and thus aiding the process of fertilisation.



TEASEL-HEADS.
1, 2, and 3 are successive flowering stages. 4, The elongated head in fr

XII

WAYSIDES AND WASTES IN SUMMER (*Continued*)

Composite Flowers

There are so many flowers of the order *Compositæ* in bloom by the wayside and on waste ground during the summer months that we devote a chapter entirely to them.

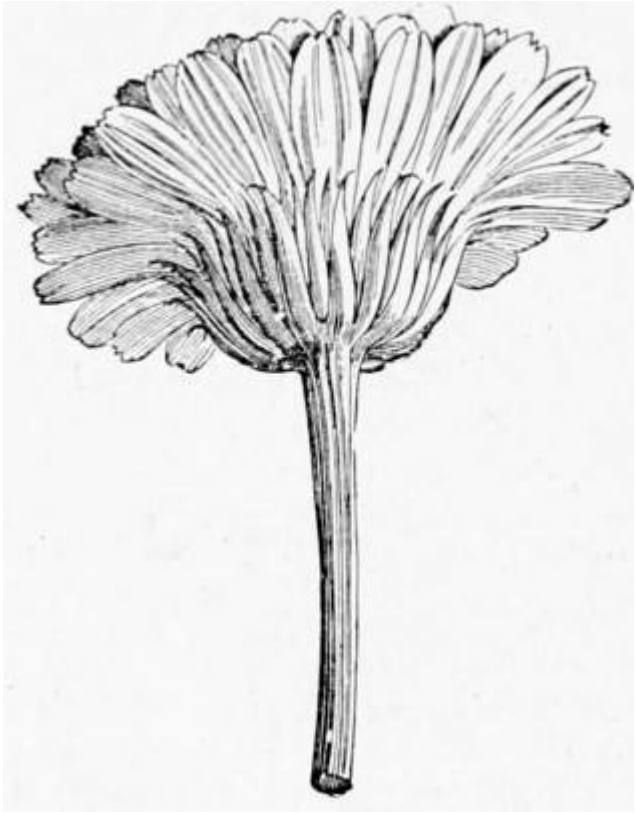
This group is the largest of the natural orders, and is computed to contain about a tenth of all the known flowering plants. The chief distinguishing characteristic of the order is the arrangement of the flowers into crowded heads, each consisting of a number of little flowers or *florets* that are sessile on a common *receptacle*, as in the case of the Daisy, the Dandelion, and the Thistles.

The florets of each head or *capitulum* are generally arranged into two well-defined sets—the florets of the disc, occupying the centre; and the florets of the ray, spreading more or less in a radial manner from the edge of the disc. These two sets are often of different colours, as in the Daisy, where the disc florets are of a deep yellow, while the ray florets are white or pink.

In some of the Composites all the florets of each head are perfect, while in others some are perfect and some imperfect. Then, as regards the latter, they may be staminate or male florets, with no pistil; pistillate or female flowers, with no stamens; or neuter florets, possessing neither stamens nor pistil. In some few cases all the florets of one head are staminate, while the pistillate florets alone form other heads; and in these instances the two kinds of heads may be found

on one plant, or only one kind may exist on the same plant. In all cases the capitulum is surrounded by one or more whorls of bracts which are often closely overlapping.

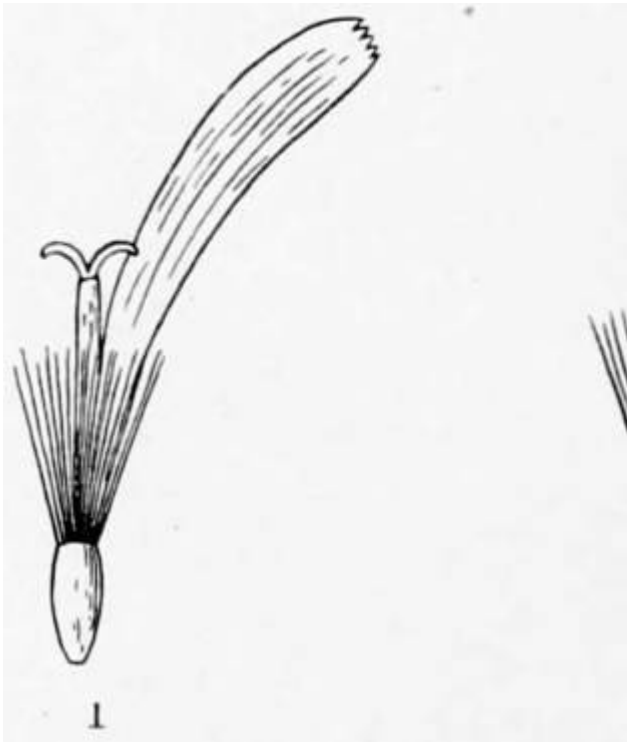
The florets seldom possess a distinguishable calyx, but there is sometimes an indication of the presence of five sepals; in many, however, the calyx is represented by a whorl of hairs on the summit of the ovary. Such a whorl is known as the *pappus*, and it frequently enlarges as the fruit ripens, forming a kind of parachute that allows the fruit to be carried great distances by the wind. The hairs of the pappus are often sessile on the fruit, but sometimes mounted on the summit of a slender stalk, as in the Dandelion. Further, the hairs which constitute the pappus may be simple or feathered.



CAPITULUM OR FLOWER-HEAD OF THE MARIGOLD, showing the *involucr* whorl of overlapping bracts.

The corolla frequently consists of five petals, united into a tube with as many teeth; but it is often *ligulate* or strap-shaped, in which case the presence of five petals is often denoted by five minute teeth at the tip.

Where stamens exist they are five in number, attached to the petals, and the anthers are generally united in such a manner that they form a tube within the tube of the corolla.



FLORETS OF A COMPOSITE FLOWER.
In fig. 1 the corolla is strap-shaped; in fig. 2 it is

Fertilisation is brought about much in the same way in many of the composite flowers:—The anthers open inwards, discharging their pollen within the tube formed by themselves, and just above the stigma which, as yet, is immature. The style then lengthens, pushing its way up through the anther-tube, and brushing up the pollen by means of the tufts of hairs on its surface. At this stage a dense cluster of pollen cells, completely covering the top of the style, may be seen projecting above the tube of the corolla, and the pollen is sooner or later scattered, the distribution being aided greatly by the various

insects which visit the flowers. The upper part of the style now divides into two parts, and the branches diverge, exposing the stigmatic surfaces which form the inner sides of the fork. It will thus be seen that the florets are not self-pollinated, since the stigma is generally mature after the pollen has all been removed from the same flower.

Our first example of this order is the Yellow Goat's-beard (*Tragopogon pratensis*), also known as Jack-go-to-bed-at-noon. This is a common wayside plant, of a glaucous green colour, with a milky sap. Its stem is erect, from one to two feet high, and the whole plant is smooth. The flower-heads are solitary, large, yellow, and surrounded by a single row of narrow bracts that are united below; and the peduncle is thickened at the top. The bracts are generally as long as the florets, and the latter usually close about the middle of the day. The fruit is long and narrow, with longitudinal ridges; and the pappus consists of rows of feathery hairs which interlock and form a very shallow cup. The flowers bloom during June and July.



THE YELLOW GOAT'S-BEARD.

The Bristly Ox-tongue (*Helminthia echioides* or *Picris echioides*), also a common plant, is more or less covered with rigid, hooked bristles, each of which

arises from a swollen, white base; and it has a milky sap. The stem is stout, branched, very bristly, and grows from two to three feet high. The leaves are simple and toothed, the upper ones cordate and embracing the stem, and the lower ones *auricled* or eared. The heads are terminal, consisting of yellow, ligulate florets, surrounded by five large cordate bracts. The fruit is brown, curved, with transverse ridges and a stalked pappus of feathery hairs. This species flowers from June to September. It is shown on Plate III.

In the same genus we have the Hawkweed Picris (*P. hieracoides*) which bears yellow flowers from June to September. Its stem, more slender than that of the last species, is from two to three feet high, branched towards the top, and rough with hooked bristles; and the leaves are lanceolate and toothed. There are numerous heads of flowers, about an inch in diameter, usually arranged in a corymb, but sometimes in an umbel, and there are bracts on the peduncles.



THE HAWKWEEK PICRIS.

The Strong-scented or Acrid Lettuce (*Lactuca virosa*) is moderately common on dry wastes. It is an acrid, glaucous, leafy and prickly plant, with a milky juice. Its erect stem grows to a height of three or four feet. Its leaves are spreading, obovate in form, with toothed margins, and bristly hairs on the under side of the midrib. The lower leaves are frequently marked with dark spots, and the upper ones have pointed auricles which clasp the stem. The heads of

flowers are small, pale yellow, and arranged in a loose, spreading panicle. The bracts overlap, the outer ones being shorter, and the receptacle is flat. Each head contains only a few florets. The fruit is flattened, black, with a beak as long as itself and a pappus of many simple hairs. The flowers appear during July and August.

Another Lettuce, known as the Prickly Lettuce (*L. Scariola*), is somewhat rare. It is really less prickly than the last species, but is equally tall, and flowers during the same months. Its leaves are erect, lanceolate, sagittate, with a wavy margin; and the upper ones clasp the stem. The fruit of this species is of a greyish colour, and has a beak of the same length.

Two species of Sow-thistle (genus *Sonchus*) are included among our wayside Composites. They are erect, succulent plants, from two to three feet in height, with a milky juice, and either toothed or pinnatifid leaves. Their flower-heads are yellow, arranged in a corymb, and bloom during the whole of the summer. Each head is surrounded by several rows of overlapping bracts, and the receptacle is flat and pitted. The fruits are considerably flattened, without beaks; and the pappus consists of several rows of fine, silky, unbranched hairs.

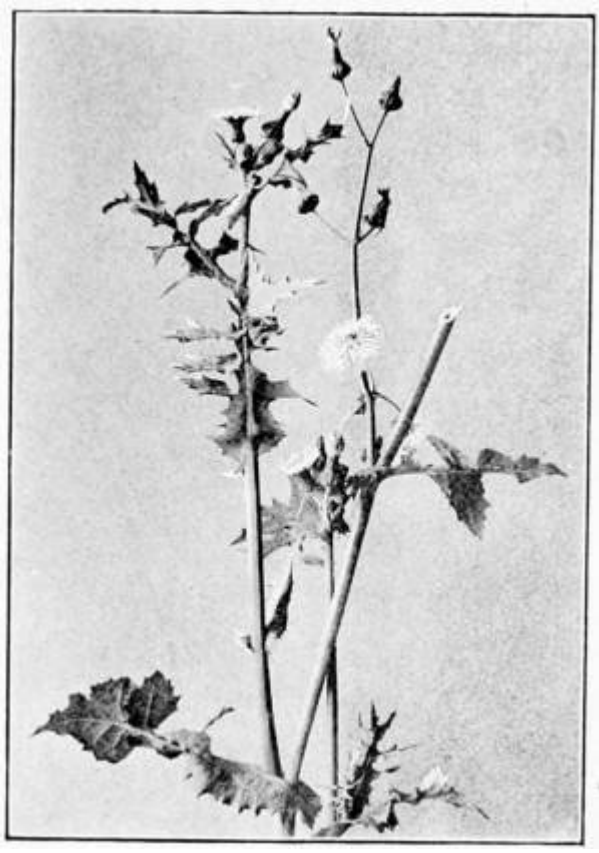


THE PRICKLY LETTUCE.

One species is known as the Sharp-fringed Sow-thistle or the Common Milk-thistle (*S. oleraceus*). Its leaves are sometimes deeply divided, but always more or less toothed; and the teeth often terminate in sharp prickles. The upper ones clasp the stem, and have spreading, arrow-shaped ears. The stem is branched and hollow; and the fruit is ribbed and transversely wrinkled.

The second is the Common Sow-thistle (*S. asper*)—a very similar plant, but may be distinguished by its leaves, which are more spinously toothed, with *rounded* ears. In this one the fruits are also ribbed, but they are not wrinkled transversely.

The Smooth Hawk's-beard (*Crepis virens*) has a furrowed, branched stem, from a few inches to three feet in height. Its spreading radical leaves are deeply toothed, and narrower towards the base; and the stem leaves are narrow and sagittate. The numerous small heads of yellow flowers are panicled, and the outer florets are often tinged with red. The heads are surrounded by two rows of bracts, the outer of which are shorter and narrower, and the whole involucre assumes a conical form after flowering. The fruit is shorter than the pappus; tapering, but not beaked; and the pappus consists of several rows of unbranched, silky hairs. This plant flowers during July and August. It is very common on waste land, and may be frequently seen growing on old walls, and even on the roofs of country cottages and out-houses.



THE SHARP-FRINGED SOW-THISTLE.

The genus *Hieracium* (Hawkweeds) is a puzzle not only to the beginner, but also to experienced botanists, who have not yet agreed as to its division into species. According to some authorities these latter amount to seven, but they, or rather some of them, are so variable, and present so many intermediate characters, that some botanists divide the British members into no less than thirty-three species.

All the plants of the group agree in the following

particulars:—They have a milky sap. The leaves are nearly all radical. The flower-heads are either yellow or orange, surrounded by several rows of overlapping bracts. The receptacle is pitted. The fruit is not beaked, and its pappus consists of a single row of rigid, brittle, brownish hairs, which are simple and of unequal lengths.

One species at least is a common wayside flower, and this is the Shrubby Hawkweed (*H. boreale*). It grows from two to four feet high, and bears a corymb of many yellow heads, from July to September. Its stem is hairy below, downy with fine branched hairs above, and bears rigid, erect branches which are leafy, and often of a reddish colour. This species has no radical leaves. The stem leaves are ovate or lanceolate and toothed, the upper ones broad and slightly clasping the stem. The peduncle is scaly or woolly, and the involucre bracts are of a blackish green colour.

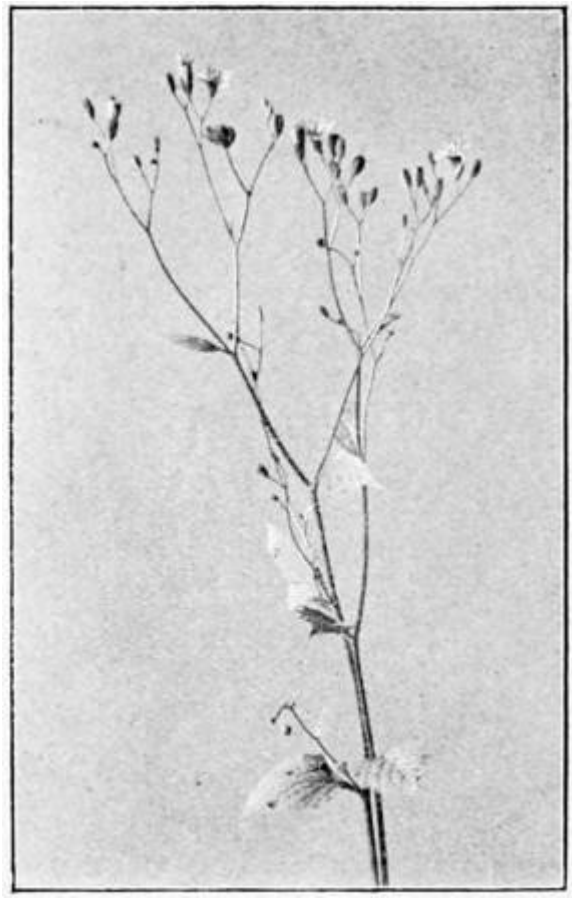


THE SMOOTH HAWK'S-BEARD.

The Nipplewort (*Lapsana communis*) is another very common Composite of waysides and wastes. Its stem is erect, from one to two feet high, branched, armed with scanty stiff hairs below, and smooth above. The leaves are thin and usually hairy, the lower ones ovate, pinnatifid or coarsely-toothed, with a few smaller lobes along the stalks, and the upper ones small, and entire or only slightly toothed. The flower-heads are small, yellow, in a loose panicle

with long slender stalks. The involucre consists of about eight glaucous scales, about a quarter of an inch in length, and a whorl of small outer ones. The fruits are flattened, with many longitudinal nervures, and have no pappus. The flowers may be seen from July to September.

The Chicory or Succory (*Cichorium Intybus*) is a local plant, but often very abundant where it exists. It has a long tap root; and a strong, erect, bristly and sticky stem. The lower leaves are spreading and hairy, deeply divided, with a large terminal lobe, and smaller lateral lobes which are pointed and coarsely toothed. The upper leaves are lanceolate, clasping the stem, with pointed auricles. The flower-heads are of a bright blue colour, large and conspicuous, mostly in sessile clusters of two or three along the rigid, spreading branches, but a few are terminal. The involucre consists of about eight inner bracts, and a whorl of outer ones that are much shorter. The florets are large; and the fruits are smooth, or nearly so, and closely enveloped in the lower part of the involucre. The time of flowering is from July to October.



THE NIPPLEWORT.

Our next species is the Burdock (*Arctium Lappa*), familiar as a wayside plant not only on account of its abundance and its large size, but also on account of its globular flower-heads which cling so tenaciously to our clothing by means of the hooked points of the inner involucre bracts. It is a very stout, branching plant, varying from two to six feet in height, with very large, stalked, cordate lower leaves that often exceed a foot in length. The upper leaves are smaller,

and broadly ovate; and both these and the lower ones are smooth or nearly so on the upper surface, but often covered with a short white down beneath. All the leaves are also finely toothed, but bear no prickles. The flower-heads are in terminal panicles, and are surrounded by many bracts which are either quite smooth or covered with a white, woolly down. The florets are purple, and all equal in size. The fruits are large, and bear a short pappus of stiff hairs.

We now come to the interesting group of Thistles, all distinguished by their very hard stems; their cut or toothed leaves, which are generally very prickly; and their round or oval heads of flowers, surrounded by many whorls of overlapping, and usually prickly, bracts. There are no ray florets, but all are tubular and approximately equal in length.

Our first example is the Welted Thistle (*Carduus crispus* or *Carduus acanthoides*), which is a common plant in the South of England, but much less abundant in the North. In general appearance it closely resembles the Musk Thistle (p. 266), but is usually taller. The stem is covered with prickles which run downwards in lines from the bases of the leaves. The flowers are purple, in small, globular, clustered heads, which droop slightly; and the numerous bracts of the involucre are narrow, more or less erect, and terminate in a spreading or hooked prickle. The pappus consists of rough, unbranched hairs. The above is the description of the commonest form of this thistle, but it is a very variable species. The plants vary from one to three feet in height, and flower from June to August.



THE BURDOCK.

Throughout the summer we may meet with the Spear Thistle (*C. lanceolatus*), a very abundant species which grows on almost all waste places. The plant is a stout one, varying from about one to five feet in height, with a winged, prickly stem. The leaves are cut into short, narrow lobes, with a long and pointed terminal one. They are covered above with stiff hairs, and below with a white down; and all the lobes terminate in stiff spines. The involucre is oval

in form, covered with cottony down; and its bracts are lanceolate, terminating with a stiff, spreading spine. The flower-heads are few in number, with purple florets, and measure about an inch and a quarter in diameter.



THE SPEAR THISTLE.

Another common species is the Creeping Thistle (*C. arvensis*), which has a perennial, creeping rootstock that gives off erect annual stems from two to four feet in height. The stem is not winged, but the prickly leaves clasp it, and sometimes extend a little way down at their bases. The leaves are narrow, smooth, with edges turned inwards, very prickly, and cut into numerous narrow lobes. The flower-heads

are small, arranged in loose terminal clusters, and are surrounded by numerous, closely-placed bracts with small, sharp points. The flowers are always imperfect, and the male and female blooms always occur on separate plants. The heads of the male plants are globular in form, with spreading purple florets; while those of the female plant are longer and almost cylindrical in form, with longer bracts and shorter florets. The pappus consists of numerous feathery hairs which grow very long as the fruit ripens. This species flowers during July and August.

The Tansy (*Tanacetum vulgare*) is common in the hedgerows of most localities, and is easily recognised by the powerful odour and bitter taste of its leaves and flowers. It has a creeping root; an erect, strong stem, which is either quite smooth or (generally) slightly downy; and large, pinnate leaves, with narrow, deeply-toothed or pinnatifid segments. There are a large number of flower-heads, nearly half an inch in diameter, of a bright yellow colour, and arranged in large flat-topped corymbs. This plant is common in most parts of Britain, grows to a height of about three feet, and flowers during August and September.



The Creeping Thistle.

The Mugwort (*Artemisia vulgaris*) is a very common roadside plant in most districts, valued by many villagers as a remedy for rheumatism. It has a short, woody rootstock; and erect, branching stems varying from two to four feet in height. The leaves are deeply cut into narrow, acute segments which are either coarsely serrate or lobed. They are green and smooth above, but very white with a woolly down below. The flower-heads are very numerous, erect, and arranged in a somewhat crowded, long, terminal

panicle. Each head is surrounded by a woolly involucre, and consists of from fifteen to over twenty florets, either all perfect or including a few without stamens. They are oval in form, and of a reddish or yellowish-brown colour. The plant blooms throughout the summer.



THE TANSY.

In the same genus is the Absinth or Wormwood (*A. Absinthium*), which is not so tall or so slender as the last species, from which it may readily be distinguished by its powerful aroma and bitter taste. The whole of the plant is whitish with a close, fine down; and the erect stems, from one to two feet

high, are stiff and hard. The leaves are very similar to those of the Mugwort, but are much broader, are silky on both sides, and the narrow lobes of the leaves are blunt at the tips. The flower-heads are also similarly arranged, but they are almost globular in form, very silky, and more or less drooping. The florets are numerous, and of a dull yellow colour, the central ones being mostly fertile, while the outer, without stamens, are small, and often barren. The plant flowers during August and September, is not so common as the last species, but is abundant in districts near the sea.

One of the most conspicuous flowers of the summer is the Common Ragwort (*Senecio Jacobæa*). It belongs to the same genus as the Groundsel, but differs in having very showy, terminal corymbs of large, bright yellow flowers with spreading rays. Its erect stem does not branch, as a rule, except near the top, and reaches a height of from one to three or four feet. The outer bracts of the involucre are small and few in number, and both these and the inner ones are generally tipped with black. Occasionally we may meet with plants of this species in which the flower-heads have no ray, but in general the ray is well-formed, and consists of about twelve narrow or oblong florets.



THE WORMWOOD.

The Common Feverfew (*Matricaria Parthenium* or *Chrysanthemum Parthenium*) is a very abundant wayside flower, of which a double variety is commonly grown in gardens. The plant reaches a foot or more in height, and flowers freely from July to September. The stems are erect and branched; and

the leaves are stalked and pinnately divided into ovate or oblong, lobed, toothed segments. The numerous flower-heads are arranged in a corymb, and are about half an inch in diameter, with white ray and yellow disc. The plant may be distinguished from similar species of the same genus by the little toothed border on the summit of the ripe fruits, and by the strong and somewhat pleasant odour of all its parts.



THE RAGWORT.

Even more common, in most places, is the Corn Feverfew or Scentless Mayweed (*M. inodora*), which

flowers from June to the end of the summer. Its stem is erect, with spreading branches; and the sessile leaves are two or three times divided into narrow, almost hair-like segments. The flower-heads are much larger than those of the last species, sometimes reaching a diameter of about two inches, and are solitary. The involucre is brown, with a membranous edge; the ray white, and the disc yellow. It is sometimes confused with the Wild Chamomile, but may be distinguished by the shape of the receptacle, which is hemispherical, and not so conical as in *Chamomilla*.



THE SCENTLESS MAYWEED.



THE YARROW OR MILFOIL.

Our last example of the Composites of the wayside is the Yarrow or Milfoil (*Achillea millefolium*)—a plant that might be mistaken by the beginner for one of the Umbellifers when seen at a distance; but a closer examination will show not only that the level-topped inflorescence is a dense, terminal corymb, but also that the flowers are collected into little heads, each of which consists of a few white or pink, pistillate ray-florets, surrounding a little cluster of tubular, perfect, yellow florets of the disc. The leaves are narrow oblong, and very finely cut into many hair-like, branching segments. The whole plant has a strong and rather pleasant odour. It grows from six to eighteen inches high, and flowers from June to September.

XIII

WASTES AND WAYSIDES IN SUMMER (*Continued*)

Continuing our list of the numerous wayside flowers of the summer months, we take first the Rampion Bellflower or Ramps (*Campanula Rapunculus*), of the order *Campanulaceæ*. The flowers of this order are usually easily distinguished by their bell-shaped corolla, mounted on an inferior ovary, and by their general resemblance to the Canterbury Bells so familiar to us as favourite garden flowers. The Rampion is to be seen on some of the sandy or gravelly wastes of the South of England during July and August, but is rather local in its distribution. It has an angled, erect stem, from two to three feet high, rough with stiff, white hairs. The stem leaves are narrow, pointed, and usually entire; but the lower leaves are broader, with slightly-scalloped edges, on long stalks. The blue flowers are arranged in erect terminal racemes, either simple or branched, each flower having a short stalk. In order to distinguish between this and other species of the same genus we should note that the segments of its calyx are narrow and entire; and that the corolla is divided deeply into five narrow, pointed segments.

The Great Bindweed (*Convolvulus sepium*) of the order *Convolvulaceæ*, is very conspicuous in most hedgerows, and is probably so well known that a description need hardly be given for purposes of identification, but we must call attention to a few interesting features that might be overlooked. It is both a creeper and a climber, for it has a creeping

rootstock that enables it to travel considerable distances below the surface of the ground, and a twining stem, usually four or five feet long, by which it climbs over the surrounding plants or shrubs. The large, white flowers, which bloom from June to August, are arranged singly on short stalks. Each has a pair of rather large bracts which completely hide the calyx, and which might at first be mistaken for the calyx itself.

The Small Bindweed is, perhaps, more commonly seen in fields than in hedgerows, and is included among the field flowers on p. 228; and the Dodders, belonging to the same order, are described with the other parasitic plants in Chapter XXIII.



THE RAMPION BELLFLOWER.

The four British plants of the order *Solanaceæ* are all wayside species, flowering from June onwards, and may be considered together here. They possess the following features in common:—The leaves are alternately arranged, without stipules. The flowers

are regular, with a five-toothed or five-lobed calyx, and a corolla of (usually) five united petals which are folded in the bud. The number of stamens correspond with that of the lobes of the corolla, and the ovary, which is two-celled, ripens into a berry containing several seeds, except in the Henbane, where it forms a capsule.

The Henbane (*Hyoscyamus niger*) is an erect plant, with a branching stem from one to two feet high, and the whole is more or less coarse and hairy, with a viscid touch and an unpleasant odour. The flowers are of a dingy yellow colour, and are arranged, with very short stalks, in one-sided, leafy spikes which are curved backwards before the flowers are open. The calyx is at first short, but grows longer, as the fruits ripen, until it is about an inch long. It has prominent veins, and its five lobes are stiff and bristly. The dingy corolla also reaches a length of an inch or more, and is distinctly marked with dark bluish veins. This plant flowers from June to September, and is moderately common in waste places, especially near houses.

The other three flowers of this order referred to are all known as Nightshades, and two of them belong to the genus *Solanum*, in which the flowers are arranged in few-flowered terminal or lateral cymes, on short stalks. The corolla has scarcely any tube, and the flowers are easily distinguished by the peculiar arrangement of the five anthers, which are on very short filaments, and are placed close against the style in such a manner as to form a compact cone in the centre of the flower.



THE GREAT BINDWEED.

One species—the Black Nightshade (*S. nigrum*)—is rather local in its distribution, but often very abundant where it occurs, appearing as a common weed on cultivated soils. It is an erect, spreading herb, either quite smooth or slightly hairy, growing from six inches to two feet high, with swollen angles on its branching stem. Its leaves are stalked, ovate, more or less wavy, with large angular teeth; and the

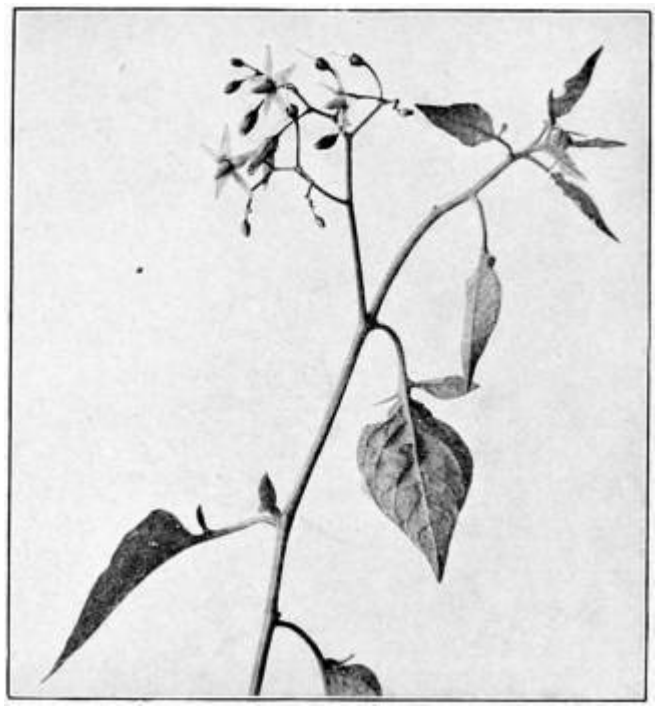
small, white flowers are on short lateral stalks. The fruit is a small, round, black or scarlet berry. This species may be seen in flower from June almost to the end of the year.



THE HENBANE.

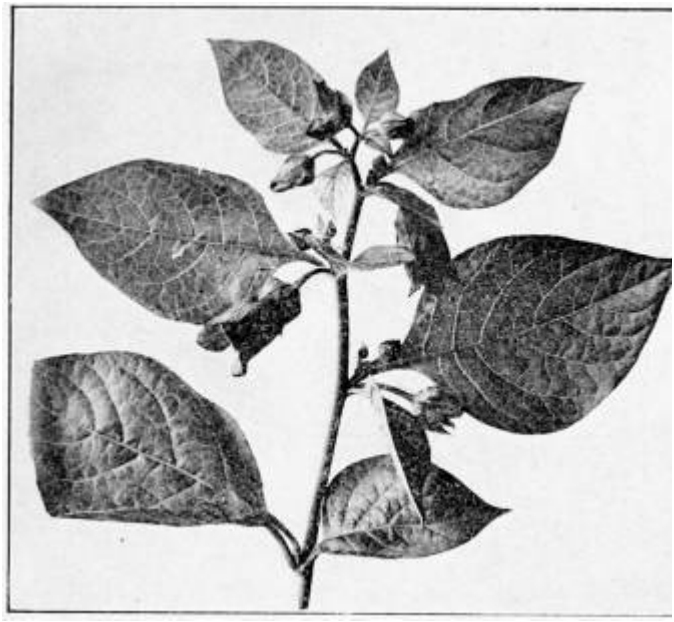
The other species—the Woody Nightshade or Bittersweet (*S. Dulcamara*)—is much more common, and may be seen straggling among the hedgerow shrubs almost everywhere. It is a woody climber that supports itself by means of its zig-zag stem, and often reaches a height of six feet or more. The flower

seems to be very well known, but is often, if not generally, spoken of as the Deadly Nightshade, which is a much rarer species with quite a different habit and appearance. The leaves are stalked, and usually more or less heart-shaped. Sometimes they are entire, but frequently there is a small lobe on each side of the base. The flowers, though rather small, are very pretty, the conspicuous cone of yellow anthers forming a bright centre to the spreading purple corolla. They bloom from June to September; and towards the end of the season the bright red fruits may be seen in abundance while the flowers are still appearing.



THE WOODY NIGHTSHADE OR BITTERSWEET.

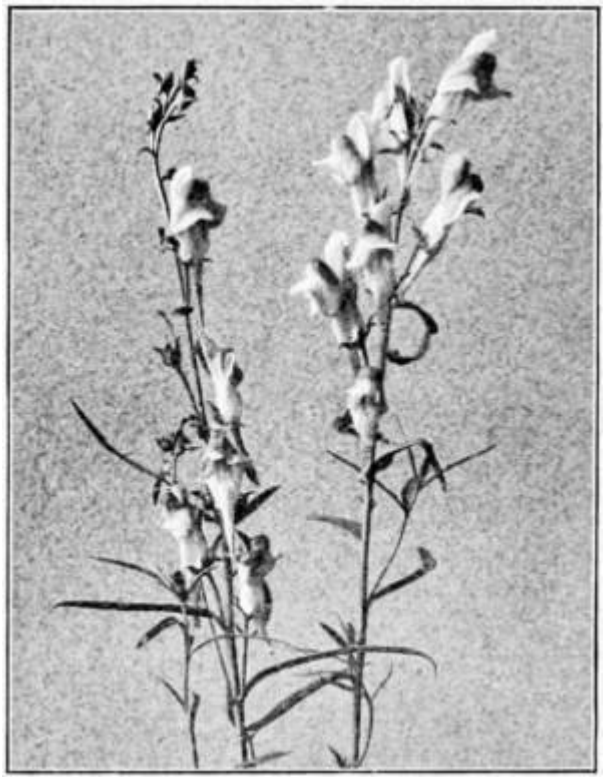
The true Deadly Nightshade or Dwale (*Atropa belladonna*), of the same order, is a very local plant, occurring principally in waste places in the South of England. It is an erect, branching herb, either smooth or slightly downy, reaching a height of two or three feet, and flowering from June to September. The leaves are large stalked, ovate, and entire; and each one has, usually, a smaller leaf, growing from the same point on the stem and looking like a stipule. The flowers are very different in general appearance from those of the other nightshades. They are large—about an inch long, and solitary, on short stalks, in the axils of the leaves or in the forks of the stem. The calyx is a broad bell, deeply cut into five lobes; and the corolla is a deep, regular bell, of a pale purple colour, with five short, broad lobes. The fruit is a large, poisonous berry, almost globular, but flattened above.



THE DEADLY NIGHTSHADE.

On waysides and in neglected fields we meet with the very common Red Bartsia (*Bartsia Odontites*) of the order *Scrophulariaceæ*. This is a small, tough plant (see Plate III), from six inches to a foot or more in height, rather downy, with spreading branches. It may be readily recognised by its several one-sided spikes of numerous purple-red flowers, with a bell-shaped, four-pointed calyx, and a corolla that is divided into a longer upper, and a shorter lower, lip. The leaves are long and narrow, with a few teeth; and the fruit is an oblong capsule. The above description applies to the most usual form of this plant, but it is a very variable species, especially as regards the form of the leaves and the branching of the stem.

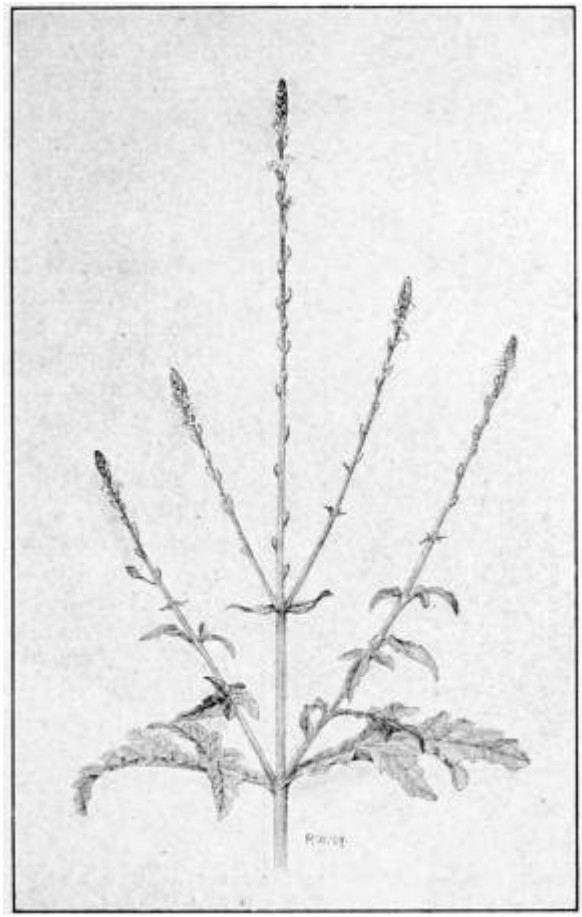
The Yellow Toadflax (*Linaria vulgaris*), of the same order, is a very pretty plant, from one to three feet high, exceedingly common on banks, hedges, and the borders of fields, bearing dense, terminal racemes of yellow flowers from June to October. Its calyx is small, and deeply divided into five segments; and the corolla, which has a long pointed spur at the base, is closed above by the bright orange 'palate' of the lower lip.



THE YELLOW TOADFLAX.

In the order *Verbenaceæ* we have the common Vervein (*Verbena officinalis*), a common plant in the dry wastes of the South of England, and moderately frequent in some other parts. This is a smooth, erect plant, with long, spreading, wiry, four-angled stems; and small, lilac flowers in long, slender spikes. There are but few leaves towards the top of the plant, and these are narrow and sessile, while the lower leaves are broader, stalked, and coarsely toothed. When the flowers first appear they are close together, but the spike increases in length as the flowering proceeds, so that the lower flowers and fruits become more

distant. Each flower has a five-toothed calyx, and an irregular corolla with a short tube and five unequal lobes. The Vervein grows from one to two feet high, and flowers from July to September.



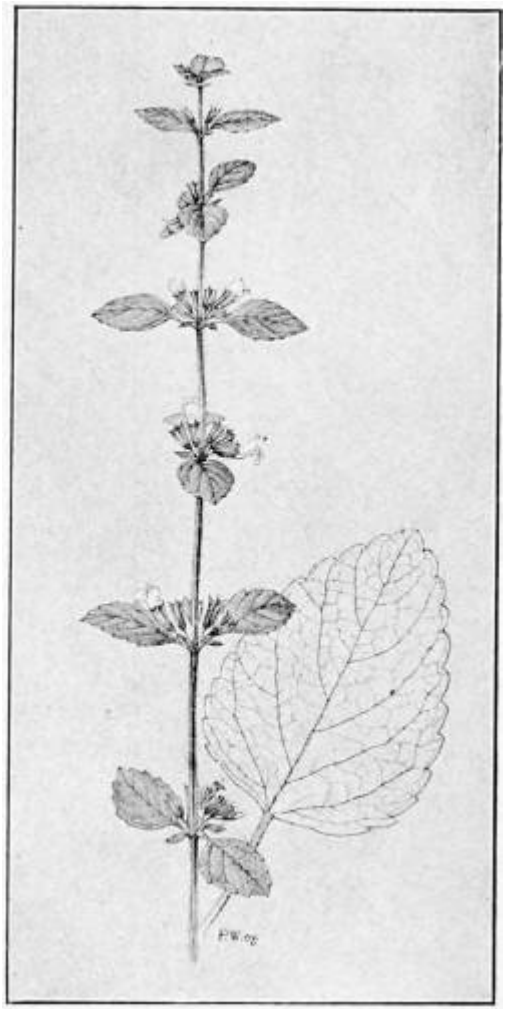
THE VERVEIN.

Passing now to the Labiates, we deal first with two species of Calamints (genus *Calamintha*), which are to be distinguished from the other genera of the

order by their axillary cymes of flowers, with calyx and corolla both lipped, and the upper lip of the latter erect and flat.

One of these, the common Calamint (*Calamintha officinalis*), is a hairy plant, with an erect, branched stem, one or two feet high, and stalked, ovate, toothed leaves. The whorls of flowers are compound, in forked, axillary cymes. The calyx is tubular, with thirteen ribs and five pointed teeth. The three upper teeth are united at their base to form the upper lip, while the other two, longer and narrower, form the lower. The corolla is almost twice as long as the calyx, with an upper, erect lip, and a lower lip with three broad lobes. The stamens are four in number, in pairs, under the upper lip.

The Lesser Calamint (*C. Nepeta*) is a very similar plant, by some held to be merely a variety of *C. officinalis*. Its leaves are shortly stalked, but slightly toothed, and only about half an inch in length. The flowers are about as long as the leaves, arranged in whorls of eight or ten, with corolla about half as long again as the calyx. In both species the mouth of the calyx is hairy, but the hairs are much more prominent in the Lesser Calamint than in the last. Both plants are frequently seen on sunny waysides, flowering during July and August.



THE BALM.

The Balm (*Melissa officinalis*) is a common garden herb in some parts, and in the South of England it is now fairly established as a wild flower, though, at present, it is not often found very far from the habitations of man. It is a hairy plant, much like a Calamint in general appearance, growing from one to

three feet high, and bearing white flowers in July and August. Its leaves are stalked, ovate, acute, toothed or crenate, of a pale green below; and the flowers are shortly-stalked, in few-flowered, axillary whorls.

The Black Horehound (*Ballota nigra*), shown on Plate III, Fig. 2, is a coarse, hairy plant, with an unpleasant odour, commonly seen on roadsides and wastes, flowering continuously from the beginning of June to September or October. Its erect stem often exceeds three feet in height, and branches more or less freely. The purple flowers are in dense clusters in the axils of the leaves, and beneath them are several narrow, stiff bracts. The calyx is about a third of an inch long, green or purple-green in colour, with ten prominent ribs, and five broad teeth which usually terminate abruptly in a fine, stiff point. The corolla is of a purple colour, twice as long as the calyx, with an arched, oval upper lip; and a slightly longer lower lip of three segments, the middle one of which is the largest.



THE HEDGE WOUNDWORT.

Our last example of the wayside Labiates is the Hedge Woundwort (*Stachys sylvatica*)—a very abundant and pretty plant that grows most luxuriantly in damp, shady places, such as the borders of ditches, the edges of woods, and shady banks and hedgerows. Its square stem is solid and stout, straight and erect, and more or less branched. All the leaves are stalked, the upper ones being narrow and entire, while the lower are large, ovate or cordate, with a crenate or toothed edge and a very pointed apex. The flowers, which bloom from July to September, are in distant whorls of from six to ten, in the axils of the upper leaves, forming long spikes.

The calyx is bell-shaped, with ten ribs, and five spreading teeth which are pointed, but not stiff; and the corolla, the tube of which is longer than the calyx, is of a dark, red-purple colour, prettily variegated with white on the lower lip. This plant varies from one to three feet in height and has a very unpleasant odour.

We next take a few examples of the Borage family (order *Boraginaceæ*), all of which are herbs more or less rough with coarse hairs, having alternate, simple leaves, and flowers in one-sided spikes or racemes which are rolled back while in bud. In all of them the calyx has five divisions or teeth, and the corolla consists of five united petals of equal or nearly equal size. There are five stamens within the tube of the corolla, and the fruit consists of four nutlets enclosed in the persistent calyx.

One of these—the Field Scorpion Grass (*Myosotis arvensis*)—is often called the Forget-me-not, but it usually grows in dry waste places, while the true Forget-me-not is found in wet situations. The flowers of this species are also very much smaller. The stem of the plant is thin, and bears small, oval, hairy leaves. The small blue corolla has short, spreading, concave segments, and is surrounded by a calyx that is cleft to the middle, and covered with hooked hairs. The sepals spread while the flower is open, but assume an erect position when in fruit. As a further means of distinguishing between this and other similar species of the same genus we should note that the peduncle is longer than the calyx, and that the style is very short. The plant varies from six to eighteen inches in height, and flowers throughout the summer.

The Gromwell or Grey Millet (*Lithospermum*

officinale) is a stout plant with several erect, branched stems. The flowers are small, of a pale yellow colour, in leafy racemes. The calyx is hairy and very deeply cleft into five segments; and the corolla, which is about the same length as the calyx, is funnel-shaped, with small scales in the throat of its tube. This plant derives its generic name of *Lithospermum* from the nature of its fruit, which consists of white, stony nutlets with a smooth and polished surface. Its height is from twelve to eighteen inches; and the flowers appear during June and July.

Our next species—the Borage (*Borago officinalis*)—is not indigenous, but is found wild in many parts, frequently in great abundance. It is a very bristly plant, from one to two feet high, bearing bright blue flowers from June to August. Its stem has spreading branches, and the leaves are obovate, narrowing at the base into the stalk. The upper leaves are narrower than the lower ones, and have shorter petioles. The flowers are of a blue colour, or sometimes almost white, and are drooping on rather long pedicels. The segments of the corolla are spreading and very pointed; and the dark anthers are very conspicuous in the centre of the flower.

The two British Alkanets (*Anchusa*) are interesting plants, though not very common. They are coarse and hairy, and bear large, blue, bracteate flowers, distinguished by a deeply five-cleft calyx; a corolla with five spreading lobes, and a straight tube closed at the mouth by blunt, hairy scales; and five stamens included within the tube. The fruit consists of rather large wrinkled nuts.

One species, though generally known as the Common Alkanet (*Anchusa officinalis*), is really a rare plant, occurring only as an escape from cultivation in the

neighbourhood of towns and villages. It has an angular stem; narrow leaves—the lower ones very long, on long stalks, and the upper ones smaller; and forked, one-sided, spikes of sessile or shortly-stalked flowers of a rich blue colour. The calyx is bristly, longer than the corolla, and cleft into narrow divisions. This plant grows from one to two feet high, and flowers during June and July.



THE GROMWELL.

The other species—the Evergreen Alkanet (*Anchusa sempervirens*)—is not uncommon in some southern and south-western districts. It is a stout, very bristly plant, from one to two feet high, with rather large,

blue flowers in short, opposite spikes. It is shown on Plate III.

Our last flower of the Borage family is the Hound's-tongue (*Cynoglossum officinale*), which is moderately common on waste ground, flowering during June and July. This is an erect plant, from one to two feet high, with a very unpleasant odour. Its stem is stout, branched and hairy; and the leaves are thickly covered with soft down. The lowest leaves are oval, with long stalks, often ten or twelve inches in length; but the upper ones become smaller and narrower, with shorter stalks, till towards the top they are very narrow, sessile, and clasp the stem. The flowers are in racemes, with short pedicels, and have no bracts. The segments of the calyx are narrow and pointed; and the small corolla is of a reddish purple colour. The fruit is covered with little spines and is about a quarter of an inch in diameter.

On dry waysides the Buck's-horn Plantain (*Plantago Coronopus*—order *Plantaginaceæ*) is common. It may be readily distinguished as a plantain by its slender, cylindrical spikes of small flowers, and its spreading tuft of radical leaves. This species has a thick rootstock, and its leaves are either linear and undivided, or, more commonly, cut into very narrow segments. The flowers are green, with broad, hairy sepals, the whole spike measuring from one to two inches in length. They bloom during June and July.



THE HOUND'S-TONGUE.

The plants which form the genus *Chenopodium*, of the order *Chenopodiaceæ*, are essentially plants of the wayside and waste ground, and of these we shall have to note several species. Most of them are distinguished by the dusty mealiness of their leaves, though a few do not possess this feature. In general

they are characterised by alternate, flat leaves; and small, green flowers in little sessile clusters, forming spikes in the axils of the upper leaves. The little flowers usually have a perianth of five segments which more or less enclose the fruit; also five stamens, and two or three styles. The following summary of the characters of these plants will enable the reader to identify them:—

1. Stinking Goose-foot (*Chenopodium olidum* or *C. Vulvaria*.)—A procumbent or spreading plant, with a granular, mealy surface and a nauseous odour resembling that of stale fish, especially when rubbed or bruised. Stems from six inches to a foot or more in length, and much branched. Leaves stalked, small, ovate, and entire. Flowers in dense, leafless, axillary and terminal spikes which are shorter than the leaves. Moderately common in many parts, especially in the eastern counties. Time of flowering—August and September.



THE WHITE GOOSE-FOOT.

2. Many-seeded Goose-foot (*C. polyspermum*).—A procumbent or erect, spreading plant, without mealiness or nauseous odour. Stem much branched. Leaves ovate or elliptical, entire, green, less than two inches long. Flowers in axillary and terminal, leafless spikes, with a calyx that does not cover the fruit. Common in parts of England, flowering during August and September.

3. Upright Goose-foot (*C. urbicum*).—An erect plant, with a stout stem and few branches. Leaves green on

both sides. Lower leaves on long stalks, broad, ovate or triangular, with bases narrowed towards the stalk in such a manner as to approach a rhomboidal form, two or three inches long, and irregularly toothed or lobed. Upper leaves narrower, nearly entire, and acute. Flowers in small, dense clusters, forming rather long, erect spikes. The green perianth does not completely cover the fruit. Common on roadsides and waste ground, flowering in August and September.

4. White Goose-foot (*C. album*).—A very common plant, varying in colour from a pale green to a mealy white. Stem stout, erect, from one to three feet high. Lower leaves stalked, ovate or rhomboid, more or less toothed or angular, but entire at the base. Upper leaves lanceolate, entire. Spikes of flowers irregularly clustered, leafy, and usually branched; the upper ones forming a long panicle, intermixed with the upper leaves. Perianth entirely covering the fruit.

5. Fig-leaved Goose-foot (*C. ficifolium*).—by some regarded as a distinct species, but by others included among the varieties of *C. album*. It closely resembles the latter in general appearance, but its lower leaves are divided into three unequal lobes, and are somewhat spear-shaped.

6. Red Goose-foot (*C. rubrum*).—An erect plant, from one to three feet high, with smooth, triangular, irregularly-toothed leaves, resembling those of the Upright Goose-foot. The spikes, also, closely resemble those of the same plant, but the flowers have generally only two or three segments to the perianth, and these often turn red as the fruit ripens. The flowers appear during August and September. This species is moderately common in most parts, and especially near the sea, where it may be seen

growing on the shingle very close to the water's edge.

7. Mercury Goose-foot, Allgood, or Good King Henry (*C. Bonus-Henricus*).—An erect plant, from one to three feet high, growing from a thick, fleshy root like that of the Dock. Leaves stalked, triangular, acute, wavy or toothed, of a dark green colour. Upper leaves smaller, and almost sessile. Flowers in clustered, compound spikes, forming a terminal panicle, leafy below. Fruit completely enclosed in the perianth. This plant was formerly cultivated as a potherb, and is now commonly found on waste ground near villages. Time of flowering—June to August.

In the same order we have the Common Orache (*Atriplex patula*)—a very variable plant, from a few inches to three feet in height, with erect or prostrate stem, and more or less mealy in appearance. Lower leaves triangular, with spreading lobes at the base. Upper leaves narrower, and entire or slightly toothed. Flowers in simple spikes, forming leafy, terminal panicles. They are of two kinds—male and female, either mixed, or collected in separate clusters. Segments of the perianth united, pointed, sometimes toothed, and spotted above. The plant flowers from July to September, and is abundant in most parts, especially near the sea.

The order *Polygonaceæ* also includes several wayside plants which may be easily distinguished as a group by the following characters:—At the bases of the alternate leaves are membranous stipules that form a sheath round the stem. The flowers are small, arranged in clusters in the axils of the leaves, or in terminal spikes or racemes. The fruit is a small nut, enclosed more or less in the persistent perianth.

Three of the plants to which we refer belong to the genus *Polygonum*, in which the sheathing stipule is usually fringed at the edge; and the small flowers are either green or red, with a perianth of five segments, and stamens not exceeding eight in number. The little nuts, too, are either flattened or triangular. The three species may be identified by the following summary of their leading features:



THE SPOTTED PERSICARIA.

1. The Spotted Persicaria (*Polygonum Persicaria*).—A very common wayside plant, and a weed of almost all cultivated soils, growing from one to two feet high, and flowering from July to October. The leaves have, usually, a dark-coloured patch in the centre; and the stipules are fringed at the top with fine, stiff

hairs. The flowers are rose-coloured, with more or less green, arranged in short axillary or terminal spikes without any leaves; and the nuts are rather thick, but flattened, smooth, and glossy.

2. Pale-flowered Persicaria (*P. lapathifolium*).—Very similar to the Spotted Persicaria, and sometimes regarded as a variety of that species; but it differs in that its leaves are never spotted, and the lower stipules are not fringed with hairs. The peduncle and perianth, which are smooth in *P. persicaria*, are here rough, being dotted with small, projecting glands; and the styles, which are united to about half way up in the last species, are quite free in the present one. The flowers are pink, with more or less green, and do not usually bloom after August; and the plant often attains a length of three or four feet.

3. Knot-grass or Knot-weed (*P. aviculare*).—A very common procumbent weed, with wiry stems from one to two or three feet long. The leaves, seldom as much as an inch in length, are narrow, oblong, and flat; and the stipules are white, membranous, more or less cut at the edges, with a few veins. The flowers are small, very variable in colour, arranged in short-stalked clusters of about three or four in the axils of nearly all the leaves; and the fruit is a triangular nut, shorter than the segments of the perianth. This plant flowers from July to September. An erect variety, growing to a height of two feet or more, may be seen in cornfields.

The same order includes the well-known Docks (*Rumex*), which differ from *Persicaria* as follows:—The root is very thick, and grows to a great depth; the stems are erect and furrowed; and the thin membranous stipules, though never fringed with hairs, often become more or less torn. The flowers

are small, green, in axillary clusters or terminal racemes, often turning red as the fruit ripens. The perianth is deeply divided into five segments, three of which become enlarged and close over the triangular nut. Two species of this genus are abundant on waysides. They are:—

1. The Broad-leaved Dock (*Rumex obtusifolius*).—A stout plant, two or three feet high, and slightly branched. The lower leaves are ovate, cordate at the base, blunt, often eight or nine inches long; and the upper ones narrow and pointed. The flowers are perfect, reddish green, in distant whorls, forming a terminal raceme which is leafless above. The inner segment of the perianth is enlarged, ovate, distinctly toothed, with a long point. Time of flowering—July to September.

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2. The Curled Dock (*R. crispus*).—Very similar to the Broad-leaved Dock in size and habit, but flowering somewhat earlier. The lower leaves are much narrower, six to eight inches long, lanceolate, pointed, and wavy at the edges. The upper leaves are small and narrower, passing gradually into still smaller bracts towards the lower flowers. The flowers are in crowded whorls, on slender pedicels which are longer than the perianths; and the inner segment of the perianth is enlarged, cordate, but not toothed.



THE CURLED DOCK.

We have now to note two species of Spurge (*Euphorbia*) that grow by the wayside; but before doing so it will be well to make ourselves acquainted with the general characters of the interesting group to which they belong. The Spurges are herbs with a milky juice, and a stem which is usually unbranched below, bearing alternate leaves. The flowering branches, towards the top of the plant, generally radiate from one point, forming an umbel of from

two to five or more rays that proceed from the axil of one or more leaves. Each ray is usually forked, and sometimes repeatedly so, with a pair of leaves at each angle, and a little head of yellowish-green flowers between the branches. Each flower-head is surrounded by a small cup of united bracts, inside which is a whorl of little yellow or brownish glands, placed horizontally. In the centre of the head is a single female flower, consisting of a three-celled ovary, with a three-cleft style, mounted on a stalk of such a length that the flower droops over the edge of the cup. Around this female flower are from ten to fifteen little male flowers, each consisting of a single stamen with a minute scale at its base. The fruit contains three seeds, one in each carpel.

The Sun Spurge (*Euphorbia Helioscopia*) is a common species, varying from six to eighteen inches high, flowering from June to October. Its stem is generally simple, but sometimes branched at the base; and the leaves are obovate or broadly oblong, without stipules, serrate, and narrowed down at the base to a short stalk. The floral leaves are very broad—almost round—and edged with very small teeth. The umbel consists of five rays, each of which is forked, with very short branches; and the glands within the cup are nearly round. The fruits are quite smooth, and the seeds have a netted surface.

The other species—the Petty Spurge (*E. Peplus*)—is a smaller plant, seldom exceeding a foot in length, with an erect or decumbent stem branching at the bottom. The stem-leaves are oval or obovate, entire, shortly-stalked and placed alternately; and the floral leaves are cordate or broadly ovate. The flower-heads are small, surrounded by crescent-shaped glands with long points; and the carpels of the fruit

have rough keels or wings.



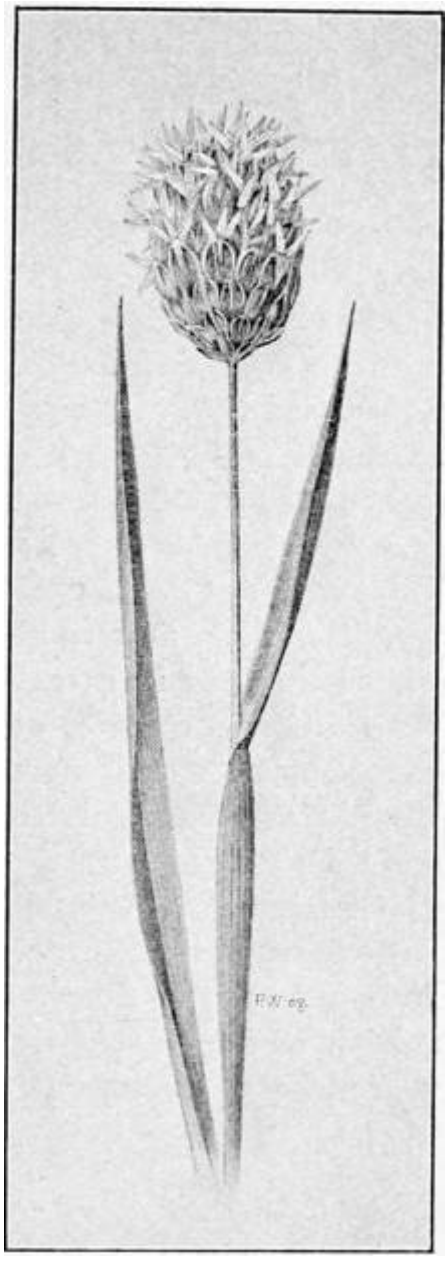
THE GREAT NETTLE.

Passing to the Stinging Nettles (order *Urticaceæ*), we have to deal with three herbs that are remarkable for the stinging hairs which clothe both leaves and stem. The leaves of all are opposite, and the flowers imperfect. The male flowers have four stamens, and a small, green perianth of four segments; while the females consist of an ovary with a tufted stigma, surrounded by a perianth of four segments the two inner of which are larger, or of two segments only. The fruit is a small, flattened nut, enclosed in the

persistent perianth. The distinguishing characters of the three species are as follows:

1. The Small Nettle (*Urtica urens*).—An erect herb, from one to two feet high, with leaves and stem smooth with the exception of the stiff, stinging hairs. The leaves are thin, elliptical, deeply and regularly toothed; and the flowers are in unbranched axillary spikes which are shorter than the petioles, the males and females being intermixed. This is a common species, flowering from June to September.

2. The Great Nettle (*U. dioica*).—A dark green herb, from one to four feet high, more or less clothed with soft downy hairs in addition to the stiff, stinging ones. The lower leaves are ovate or cordate, coarsely toothed; and the upper ones narrower. The spikes of flowers are branched, longer than the petioles, in the axils of the leaves. The flowers are very similar to those of the Small Nettle, but the males and females are usually on separate plants. This is a very common species, flowering from June to September.



3. The Roman Nettle (*U. pilulifera*).—A coarse, erect plant, from one to two feet high, with stinging hairs more powerful than those of the other species. The leaves are ovate or cordate, deeply and regularly toothed. The male flowers are in clusters along the peduncles, which are often as long as the leaves; and the females are in globular heads at the top of stalks from half an inch to an inch in length. The heads of fruits are about a third of an inch in diameter, thickly covered with stinging hairs. This plant flowers from June to September. It is not so abundant as the other nettles, and is found principally in the neighbourhood of villages, especially in the eastern counties of England.

Although the Hop (*Humulus Lupulus*) does not sting, the whole plant is rough with stiff hairs resembling those of the nettles, and it is placed in the same order. It is a climber, and clings to the hedgerow shrubs by twining its long stems, which always turn in the same direction as the sun. Its leaves are opposite, stalked, broadly heart-shaped in general form, but cut into three or five sharply-toothed lobes. The flowers, like those of the nettles, are imperfect, and the male and female blossoms grow on separate plants. The former are in lax panicles, in the axils of the upper leaves: they are small, of a yellowish green colour, each consisting of five stamens surrounded by a perianth of five segments. The females are arranged in rounded heads or spikes on short stalks in the axils of the leaves. The heads are made up of a number of closely-placed bracts, each with two little flowers at its base; and each flower consists of an ovary, enclosed in a scale, with two long, narrow stigmas. After fertilisation the scales of the head

grow very large, forming very conspicuous 'cones' in which the little fruits lie concealed. The Hop flowers from July to September, and is common in hedgerows and thickets.

Of the several wayside Grasses we have space for the mention of but one species—the interesting Canary Grass (*Phalaris canariensis*). It is a native of South Europe, introduced into this country and cultivated for its seed (canary seed), but is now often seen growing wild in waste places. It is represented on p. 209.


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3.
2.
1.



Plate IV.

FLOWER

1. Rough Cock's-foot Grass.
2. Lucerne.
3. Crimson Clover.
4. Blue Bottle.
5. Common Vetch.
6. Meadow Clary.

XIV

MEADOWS, FIELDS AND PASTURES—SUMMER

In the present chapter we shall briefly describe a considerable number of flowers which are to be seen in fields and pastures during the summer months; but we must remind the reader that many of the species

previously mentioned in Chapter VIII as flowering in similar situations in the spring, continue to bloom during the whole or a portion of the summer. A list of these is given below; and it should be noted that the flowers described in this chapter are those which do not generally commence to bloom till the month of June.

Spring Flowers of Meadows, Fields and Pastures which continue to bloom in the Summer.

Creeping Buttercup.
Bulbous Buttercup.
Field Penny Cress.
Wild Pansy.
Ragged Robin.
Spotted Medick.
Netted Medick.
White Clover.
Purple Clover.
Earthnut.
Daisy.
Dandelion.
Yellow Rattle.
Field Louse-wort.
Henbit Dead Nettle.
Common Sorrel.
Sheep's Sorrel.
Twayblade.

The Upright Buttercup or Meadow Crowfoot (*Ranunculus acris*) is often confused with the two similar species (*R. repens* and *R. bulbosus*) already described in Chapter VIII, but it may be easily distinguished from the former by the absence of

creeping stems, and from the latter by the spreading calyx and by the fibrous root without any bulbous swelling. The whole plant is covered with soft hairs more or less spreading; and it varies in height from six inches to three feet according to the nature of the soil in which it grows. Its leaves are all stalked with the exception of the few upper ones, and are very deeply divided into three, five, or seven radiating segments which are again cut into three lobes with acute divisions. The flowers are rather large, on long terminal stalks, with a calyx of five yellowish-green, concave sepals; and a very bright yellow corolla. The carpels are ovate, slightly flattened, smooth, arranged in a globular head; and the fruits are also smooth. The plant flowers during June and July.

Another 'Buttercup'—the Pale Hairy Crowfoot (*R. hirsutus*) is to be seen in our pastures; and though not so common as the three just mentioned, it is very generally distributed in England and the South of Scotland. It seldom exceeds a foot in height, and flowers from June to the end of the summer. Its stem is erect, hairy, and freely branched; and its leaves are much like those of the Bulbous Buttercup (p. 110). The flowers, however, are smaller and more numerous than those of the latter, and are of a paler yellow colour; but the sepals are bent back on the flower-stalk as in this species. The fruits are rough when quite ripe, with little tubercles along the margins.



THE GOLD OF PLEASURE.

Cruciferous flowers are not at all abundant in fields and meadows during the summer months, but one species—the Gold of Pleasure (*Camelina sativa*)—may be seen in the flax-fields of South Britain and Ireland during June and July. The plant has a simple or slightly branched stem, from one to three feet high; and its leaves are all sessile, narrow, arrow-shaped, either entire or slightly toothed, with pointed lobes at the base. The flowers are small, yellow, arranged in a long, loose raceme; and the fruits are oval

siliquas, with convex valves, a distinct central vein, and edges flattened into a narrow wing.

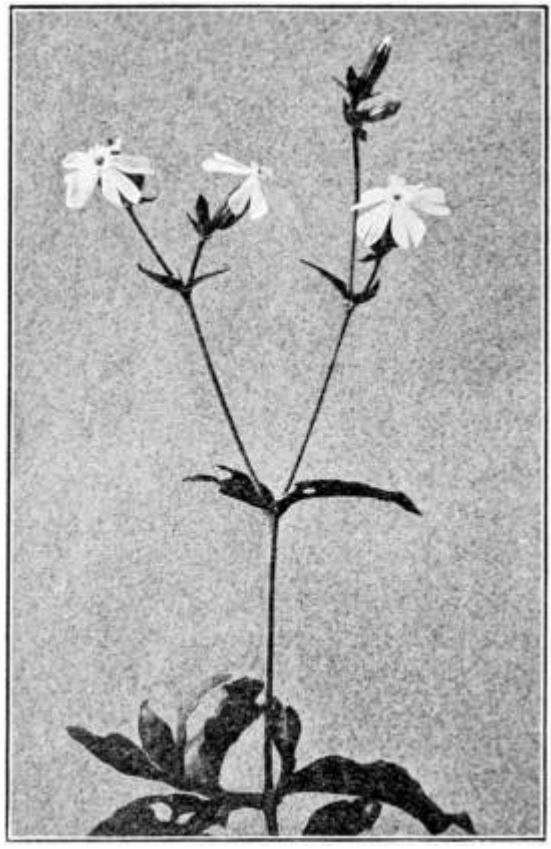


THE BLADDER CAMPION.

The order *Caryophyllaceæ* is represented in pastures by the Bladder Campion (*Silene inflata* or *S. cucubalis*)

—a flower that is easily recognised among the Campions and the Catchflys by the globular calyx. The stem of the plant is semi-erect, branched below, and from two to three feet high. The leaves are sessile, smooth, oblong, usually acute, and placed in pairs on the jointed stem. The flowers are rather large, arranged in lax, terminal panicles, and often droop slightly. The calyx is globular, veined, and about half an inch or more in diameter; and the five petals, which are deeply cleft into two lobes, have each a scale at the base of the spreading limb. The plant is very widely distributed over Britain, and is very common in some districts, flowering during June and July.

The same order contains the White Campion (*Lychnis vespertina*)—a hairy plant, with a branched stem from one to two feet high, and rather large white or very pale pink flowers that open in the evening. It is abundant in most parts of Britain, and flowers during June and July. Its leaves are oval or oblong, usually pointed, and tapering towards the base. The flowers are in loose cymes, and imperfect; the staminate and the pistillate ones being usually on different plants. The calyx is generally more than half an inch long, hairy, with ten ribs and five narrow teeth. It is tubular at first, but becomes broadly oval, with a contracted mouth, as the fruit ripens. The five limbs of the corolla are spreading and rather deeply cleft into two parts; and the fruit is a capsule that splits at the top by ten teeth which remain erect or curve only slightly outwards. The plant is found principally in fields and in open waste ground.



The White Campion.

Our fields and pastures are particularly rich in flowers of the Pea family (order *Leguminosæ*) during the summer months; and of these we shall first note the pretty Kidney Vetch or Lady's Fingers (*Anthyllis Vulneraria*), which is common in the dry pastures of most parts of Britain. The whole plant is covered with short silky hairs which lie close against the surface; and the stem, from six inches to over a foot in length, is either erect or spreading. The leaves are pinnately divided into several entire leaflets which

are half an inch or more in length, the terminal leaflet of the lower leaves being generally much larger than the others. The flowers, which bloom from June to August, are usually clustered into two dense heads at the tip of each stalk, with a deeply-divided bract at the base of each head. The calyx is densely covered with silky hairs; and the small corolla varies in colour from pale yellow to red.

In the neighbourhood of cultivated fields we may frequently meet with the Lucerne or Purple Medick (*Medicago sativa*). This is not a British plant, but it has been introduced and largely cultivated, and is commonly found as an escape. It has an erect stem, from one to two feet high; and the flowers bloom during June and July, followed by smooth, spirally-twisted pods of two or three coils. This plant appears on Plate IV, Fig. 2.

In the genus *Melilotus*, of the same order, we have to note three species, all of which agree in the following particulars:—They have trifoliate leaves; and small, white or yellow flowers in long racemes on axillary peduncles. The calyx has five teeth, and the corolla falls after it fades. The stamens are ten in number, the upper one quite free, while the filaments of the other nine are united into a split tube that surrounds the ovary. The pod is only a little longer than the calyx, rather thick in proportion to its length, with only one or two seeds, and it does not split when ripe. The three species referred to may be identified by the following descriptions:—



THE KIDNEY VETCH.

The Common Melilot (*Melilotus officinalis*) is a smooth plant, with a branched stem from two to four feet high; and long-stalked leaves with roundish or oval leaflets, and narrow, pointed stipules. The flowers are very numerous, yellow, about a quarter of an inch long, in long racemes. The petals are equal; and the hairy pods are only about a sixth of an inch long.

The Field Melilot (*M. arvensis*) is very similar, but not so tall, and the flowers are less numerous. The 'keel'

is shorter than the other petals; and the pods are ribbed and blunt. The third species—the White Melilot (*M. alba*)—is also very similar, but it has white flowers, in which the 'standard' or upper petal is the longest. All three species flower from June to August, but only the first may be described as common.

The genus *Trifolium*, containing the Clovers and Trefoils, resembles *Melilotus* in its trifoliate leaves, five-toothed calyx, and in the arrangement of the stamens; but it differs in that the stipules adhere to the leaf stalks, and the corolla often persists round the ripened fruit. Several species of this group are common in fields and pastures.



THE COMMON MELILOT.

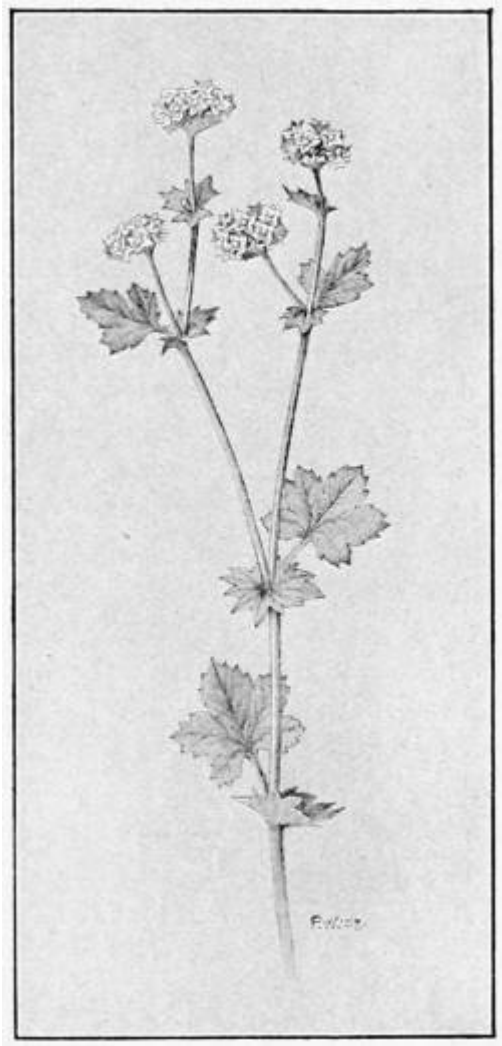
One of these is the Clustered Clover or Smooth Round-headed-Trefoil (*Trifolium glomeratum*)—a smooth plant, with purple or pink flowers, found principally in the dry pastures of South and East England, flowering during June and July. Its spreading stems are from six to twelve inches long; and the heads of flowers are small, sessile, globular,

and either axillary or terminal. The calyx is ten-veined, shorter than the corolla, with five pointed teeth which bend outwards as the fruit ripens.

The Strawberry Trefoil (*T. fragiferum*) has long-stalked, axillary heads of rose-coloured flowers which become very compact and strawberry-like when fruiting, at which time they are half an inch or more in diameter. Its creeping stem roots at the nodes; and the leaves are long-stalked, with toothed leaflets. Each head is surrounded below by a whorl of lobed bracts about as long as the calyces which become swollen after flowering. This is common in England, and flowers during July and August.

The Hare's-foot Trefoil (*T. arvense*) is a slender, erect or sub-erect plant, covered with short, soft hairs, flowering from June to the end of the summer. Its stem is branched, from six inches to a foot in length; and the heads of flowers, on long, terminal or axillary stalks, are at first nearly globular, but afterwards cylindrical and about three quarters of an inch long. The flowers are small, pink, with corolla shorter than the calyx. The latter has five very long, feathery teeth, giving the whole head of flowers a soft and feathery appearance. The plant is abundant, especially in the southern counties of England.

The Crimson Clover (*T. incarnatum*) was introduced into England and cultivated as fodder, but it is often found wild as an escape from cultivation. The plant is erect, varying from six inches to two feet in height, and is covered with soft, silky hairs. It flowers in June and July. The corolla, which is much longer than the calyx, is sometimes almost white. This flower is shown on Plate IV.



THE LADY'S MANTLE.

One of the commonest flowers of this genus is the Hop Trefoil (*T. procumbens*)—a slender plant, with erect or sub-erect stem much branched below. Its leaflets are obovate or obcordate, and toothed; and

the flower-heads are dense, globular, on long axillary stalks, each consisting of about forty bright yellow flowers. When fruiting the heads are turned downwards, and the pods are then covered by the persistent, brown corollas. This species flowers from June to August.

The Lesser Yellow Trefoil (*T. minus*) is very much like the last, and flowers at the same time, but is more slender and more procumbent; and its flower-heads, which consist of from ten to twenty pale yellow flowers, are on stiff peduncles.

Our last example of the *Leguminosæ* is the Meadow Pea or Meadow Vetchling (*Lathyrus pratensis*), which is a very common flower of moist pastures. The plant is straggling, with a weak, angled stem that supports itself by interlacing with the surrounding herbage, aided by its branched tendrils. Its stipules are large, narrow-oval in form, with an arrow-shaped base. The compound leaf has only one pair of lanceolate leaflets, the remaining leaflets having been modified into tendrils for the support of the plant. The long axillary peduncles each bear a one-sided raceme of from six to ten yellow flowers, which are followed by rather large, smooth pods. The plant flowers from June to September.

The order *Rosaceæ* contains the Great Burnet (*Sanguisorba officinalis*), the only British representative of its genus. It is very much like the Lesser Burnet (p. 301) in general appearance, but much taller and larger. It is a smooth plant, with an erect stem from one to two feet high, the upper part of which is almost leafless. The leaves are mostly radical or on the lower part of the stem, and are pinnate, with from seven to thirteen oval or oblong, toothed leaflets. The long peduncles each bear an

oval head of crowded flowers of a dark purple colour. Each flower has a calyx of four coloured lobes, enclosed within bracts; and four stamens. There are no petals. The plant is moderately common in the damp meadows of England and South Scotland, and flowers from June to August.

The Lady's Mantle (*Alchemilla vulgaris*) is a common plant in the hilly pastures of North England, but is much less frequent in the South. It varies from six to eighteen inches in height, and bears loose, terminal clusters of small yellowish-green flowers from June to August. The little flowers have a free calyx of eight segments in two whorls of four, the outer ones smaller than the inner; no petals; a few stamens; and an ovary of one or two one-seeded carpels enclosed in the tube of the calyx.

In moist meadows and other damp places we commonly see the fragrant Meadow Sweet or Queen of the Meadows (*Spiræa Ulmaria*), of the same order. This is an erect plant, from two to four feet high, bearing densely-crowded cymes of small, creamy-white flowers from June to August. Its stem is rather thick, often reddish in colour; and the leaves are large, pinnate, with from five to nine ovate, irregularly-toothed leaflets, two or three inches long, and also several smaller leaflets at the base of the stalk or between the larger ones. Each of the little flowers has a five-lobed, free calyx; five petals; numerous stamens; and an ovary that ripens into from five to eight little twisted capsules.



THE MEADOW SWEET.

The Burnet Saxifrage (*Pimpinella Saxifraga*), of the order *Umbelliferæ*, is a common plant in dry pastures, and is very generally distributed. Its stem is from one to two feet high, and but little branched; and the leaves are very variable in form—the radical ones usually pinnate, with from three to nine oval or round leaflets that are either lobed or deeply toothed; and the upper also pinnate, with the segments of the leaflets few and very narrow. The umbels are terminal, with from eight to sixteen slender rays, and no bracts. The flowers are small

and white, and appear from July to September.

The Wild Carrot (*Daucus Carota*) of the same order is also common in pastures. It is an erect plant, with a tap root, and a branching stem from one to two feet high. The lower leaves are two or three times pinnate, with segments pinnately divided into narrow lobes. The upper leaves are much smaller, with narrower divisions. The umbels are large and terminal, on long stalks. The rays are numerous and crowded; the middle ones being shorter, with pale purple flowers; and the outer ones longer, with white flowers. After flowering the rays close together, forming a dense, globular mass, or an inverted cone, concave at the top, thus more or less covering the fruits, in which they are aided by the long, narrow lobes of both the primary and secondary bracts. The fruits are covered with little hooked prickles.



THE BURNET SAXIFRAGE.

The Devil's-bit Scabious (*Scabiosa succisa*—order *Dipsaceæ*) is very common in the pastures of almost all parts of Britain, and much resembles the Field Scabious (p. 290) in general habit. Its stem is erect, branching, from one to two feet high. The radical leaves are stalked, ovate or oblong, and generally quite entire; and the stem-leaves, which are few, are of the same general form, but are sessile, and sometimes slightly toothed. The heads of purple-blue flowers are on long peduncles, and each one is surrounded at the base by about three whorls of bracts which decrease in length inwards, the outer

and longest being about as long as the flowers. The flowers of the head are all nearly of the same size and form. Each one is enclosed in a tubular whorl of united bracts with small teeth. This whorl might easily be mistaken for a calyx by those who are not acquainted with the general features of the flowers of this order, but the calyx is really combined with the ovary, its four bristly teeth being very conspicuous round the top of the fruit. The corolla is tubular, deeply cleft into four lobes; and four stamens are inserted into its tube. The fruit is small and seedlike, and does not split. This plant flowers from July to September or October.



THE WILD CARROT.

Coming now to the *Compositæ*, we have a considerable number of meadow flowers to describe; and we assume that the reader has already made himself acquainted with the nature of the flowers of this order as given on p. 175. If such is not the case, we advise him to refresh his memory with regard to them, in order that the terms used in the following descriptions may be thoroughly understood.



THE DEVIL'S-BIT SCABIOUS.

Our first species is the Rough Hawkbit (*Leontodon*

hispidus), which is very abundant in all parts of Britain except the extreme north, its rather large, yellow flower-heads being often mistaken for those of the Dandelion that are frequently seen in company with them on pasture land. Its specific name is due to the short, stiff hairs, often more or less branched, that clothe all parts of the plant. The leaves are all radical, long and narrow, decreasing in width towards the base, and either coarsely toothed or deeply cut into pointed lobes. The flower-stalk widens immediately below its solitary head, which is surrounded by hairy bracts—two or three whorls of short ones without, and a whorl of long ones within. All the florets are ligulate or strap-shaped, and yellow. The fruits are long achenes, narrower towards the top; and the pappus consists of a few short, outer hairs, surrounding about twice the number of brown, feathered ones three or four times as long. The flower stalks vary from a few inches to a foot or more in height, and the flowers bloom from June to September.

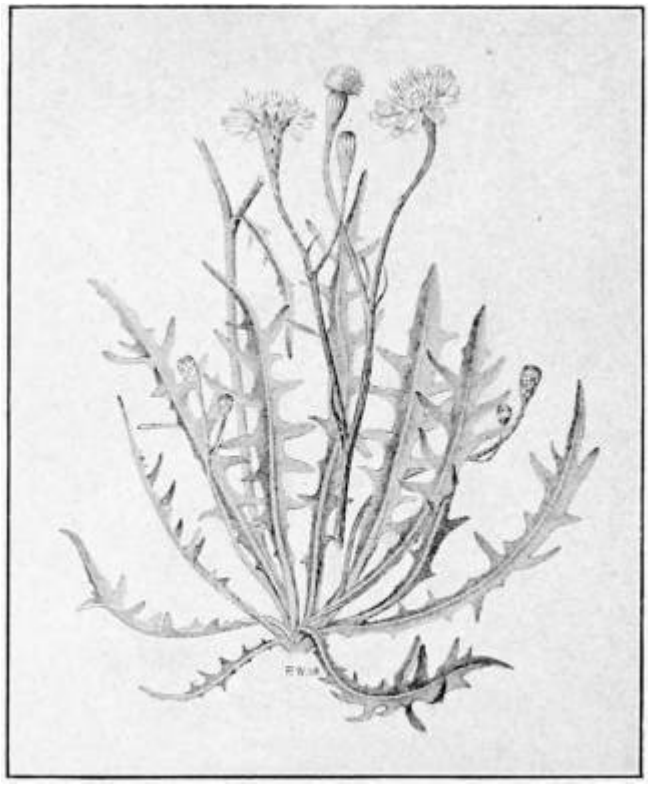


THE ROUGH HAWKBIT.

Equally abundant is the Autumnal Hawkbit (*Leontodon autumnalis*), which is also found in pastures. It is a very similar plant in many respects, but may be easily distinguished by its smaller heads of flowers on branching stalks. The flowering stems are erect, from six to eighteen inches high, each with one or two branches bearing a few small scales and a single head of flowers. The involucre consists of several rows of smooth, closely-overlapping bracts, and is narrowed at the base into the enlarged upper part of the stalk. The florets are all ligulate, as in the last species; and the pappus consists of brown, feathery hairs, all of the same length. The flowers

appear during August and September.

The Meadow Thistle (*Carduus pratensis*) is abundant in some of the southern counties of Britain and Ireland, but is rarely seen in the north. Nearly all the leaves of this plant are radical, and these are long, narrow, and covered with cottony hairs. The few leaves of the stem are narrow, with short teeth that are only slightly prickly. The stem itself grows from twelve to eighteen inches high, and is usually unbranched, with a single head of flowers; sometimes, however, it has one or two branches, each terminating in a flower-head. The involucre is globular in form, covered with cottony hairs, and composed of closely-placed bracts. The flowers are purple. The plant grows chiefly in moist pastures, and flowers from June to August.



THE AUTUMNAL HAWKBIT.

The Black Knapweed or Hardhead (*Centaurea nigra*) is a very common flower of meadows and pastures, flowering from June to September. Its stem is erect, tough, branched, from a few inches to three feet in height. The leaves are long and narrow; the upper ones entire or nearly so, and clasping the stem; and the lower coarsely toothed or divided into lobes. The flower-head has somewhat the appearance of a purple thistle, but the involucre is not prickly. The latter consists of an almost globular mass of closely-overlapping bracts, the visible portions of which are dark brown or black fringes. The florets are generally

all equal, but the outer ones are sometimes larger than the others, and sterile.



THE MEADOW THISTLE.

The Great Knapweed (*Centaurea Scabiosa*) is a somewhat similar plant, but usually larger, its stout, branched stem being generally two or three feet

high. It may be easily distinguished by its larger flower-heads, the outer, neuter florets of which are considerably enlarged. As a rule the florets are all purple, but occasionally all are white, or the outer ones white and the others purple. The bracts of the involucre are broad, with a green centre and a dark, downy margin. The fruit is surmounted by a pappus of stiff, bristly hairs of about its own length. This plant is common in the south of Britain, and flowers during July and August.

Two species of Fleabane have to be noticed. They belong to the genus *Inula*, and are distinguished by a distinct division of the flower-head into disc and ray, and also by two minute 'tails' at the bottom of the anthers.

One of these is the Common Fleabane (*I. dysenterica*) —a woolly plant, abundant in the moist pastures of the southern counties, flowering from July to September. Its erect stem is loosely branched, from six inches to two feet high. The leaves are oblong and wavy—the lower ones stalked, and the upper clasping the stem with rounded lobes at the base. The flower-heads are yellow, about three-quarters of an inch in diameter, arranged singly on the tips of the branches, or on stalks arising from the axils of the upper leaves. The florets of the ray are spreading, and much longer than those of the disc; and the fruits have a minute cup at the top, from the inside of which spring the hairs of the pappus. The smoke arising from the burning Fleabanes was supposed to kill fleas and other vermin; and the specific name *dysenterica* is due to the fact that this species has been used as a medicine in cases of dysentery.



The Black Knapweed.



THE GREAT KNAPWEED.

The Small Fleabane (*I. Pulicaria*) is a similar plant, but smaller (from six to twelve inches high) and less woolly. Its flower-heads are yellow, much smaller, on terminal and axillary stalks; and the florets of the ray are only slightly longer than those of the disc. The hairs of the pappus are not surrounded at the base by a little cup, but by a few minute and distinct scales. This species grows in the south-eastern counties of England, and flowers during August and September.

The White Ox-eye Daisy (*Chrysanthemum*

Leucanthemum) is one of the largest and most conspicuous of our composite flowers, and is abundant in dry pastures all over Britain. The plant is generally smooth; and its erect stem, either simple or slightly branched, is from one to two feet high. The lower leaves are obovate, coarsely toothed, on long stalks; and the upper ones are narrow and sessile, with a few teeth. The flower-heads are large, and placed singly on long, terminal stalks. The bracts are closely overlapping, with narrow, brown margins; the ray florets white, strap-shaped, over half an inch long; and the disc florets numerous and tubular. The flowers bloom from June to August.



THE COMMON FLEABANE.

Our last composite flower is the Sneezewort (*Achillea Ptarmica*), which is common in the hilly pastures and meadows of most parts of Britain. It has an erect stem, one to two feet high. The leaves are sessile, narrow, with fine, regular teeth, and a smooth surface. The flower-heads are arranged in a loose, terminal, flat-topped corymb. Each is surrounded by an involucre of overlapping bracts; and consists of numerous little disc-florets, intermixed with small

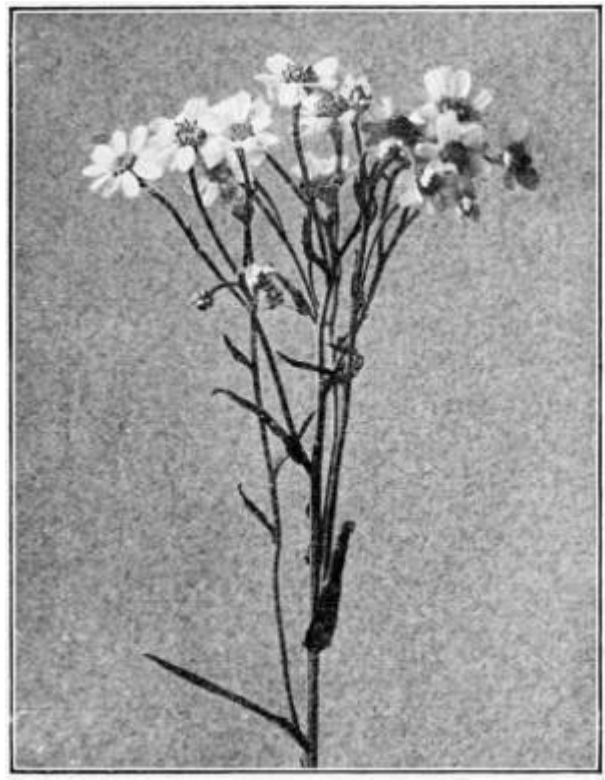
scales, and about twelve short, broad, white florets of the ray. The time of flowering is July and August.

The Common Centaury (*Erythræa Centaurium*), of the order *Gentianaceæ*, is a very common plant in dry pastures. Its stem is erect, simple below, freely branched towards the top, from six to eighteen inches high; and the leaves are ovate, spreading and closely placed below, narrow and more distant above. The flowers are rose-red or pink, in a dense corymb, with a calyx of five very narrow segments, and a corolla consisting of a narrow tube and five spreading lobes.



THE OX-EYE DAISY.

Of the order *Convolvulaceæ* we shall note one species —the Small Bindweed (*Convolvulus arvensis*), so well known as a troublesome weed in cultivated fields. It has a creeping rootstock, and a twining stem, from a few inches to two feet in length, that sometimes climbs, but more commonly trails along the ground and over low-growing plants. The leaves are stalked, arrow-shaped, about an inch and a half long, with sharp, spreading lobes at the base. The axillary peduncles are usually forked, with a single flower on each of the two branches; and there are two small bracts at the angle of the fork, and another one or a pair above these, but some distance below the flower, on each branch. The calyx is very small, but the salver-shaped corolla is usually over an inch in diameter, either pink or pinkish white. The plant flowers from June to August.



THE SNEEZEWORT.

The Meadow Clary (*Salvia pratensis*—order *Labiatæ*), shown on Plate IV, Fig. 6, is a rather rare plant, apparently to be seen only in the dry fields of Oxfordshire, Kent, Surrey, and the extreme south-west of England; but it is one of the most handsome of the Labiates. Its stem is erect, from one to two feet high. The radical leaves are large, stalked, ovate or cordate, toothed, and much wrinkled; and the stem-leaves few, ovate or lanceolate, acute, the upper ones sessile. The flowers are arranged in whorls of from four to six at regular distances, the whole forming a long, simple or branched spike. The calyx is divided

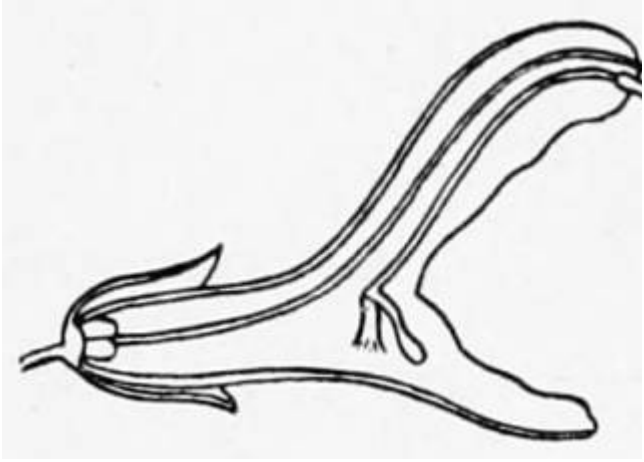
into two lips, the upper of which has often three small teeth, while the lower is divided into two lobes; and the corolla is of a bright blue colour, about three times as long as the calyx, with a long, arched upper lip and a three-lobed lower lip. There are two stamens, each with a fertile and an abortive anther connected by a thin stalk which is fastened to the short filament in such a manner that it rocks. This plant flowers from June to August.



THE SMALL BINDWEED.

The peculiar arrangement of the stamens above described is sufficient in itself to distinguish the genus *Salvia* from all the other Labiates, and the importance of the peculiarity in connexion with the pollination of the flower is so interesting that we may well spend a few minutes in studying it before passing on to other species. In the first place it should be mentioned that the stamens of *Salvia* are mature before the stigma, and that, as a consequence, self-pollination is impossible. The lower, abortive anthers of the two stamens are joined

together and form a little valve which closes the throat of the corolla tube. Each one, however, has a notch in its inner side, and the two notches, meeting in the middle, form a little hole. When a bee visits the flower, it alights on the lower lip of the corolla, and thrusts its tongue through the hole to reach the nectar at the base of the tube. In doing this it pushes the abortive anthers backwards, and the upper, fertile anther cells, which rest under the arched upper lip, are thus made to swing downwards and forwards so that they touch the bee's back; and, if they are ripe, to deposit some pollen. After the pollen has been thus removed, the style lengthens and curves downward, bringing the stigma, which is now mature, to the position previously occupied by the fertile anther cells at the time they were made to swing downwards by the bee. Thus, if a bee which has previously visited a flower with mature anthers now comes to one in which the stigma is ripe, the pollen dusted on its back by the former is rubbed against the stigma of the latter, and cross-fertilisation is the result.



SECTION OF THE FLOWER OF *Salvia*.
1. Stigma--not yet mature. 2. Stamen

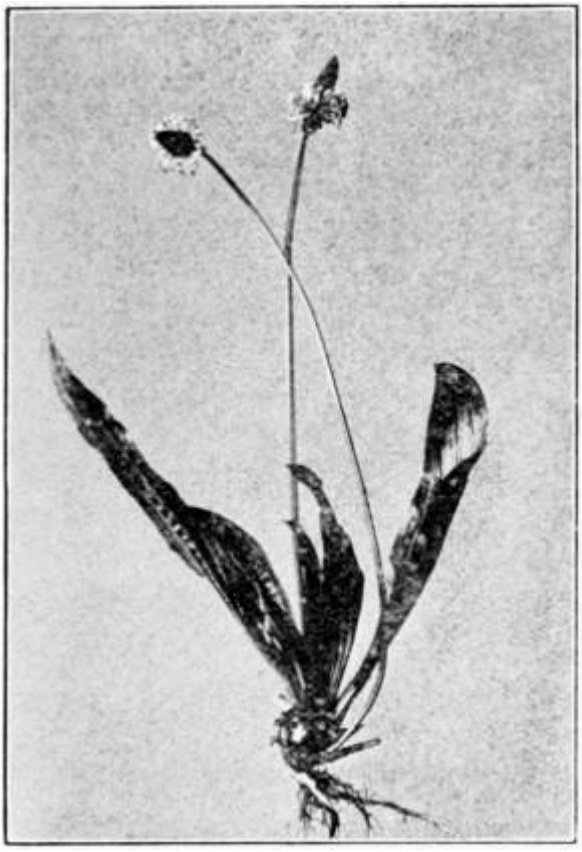


THE SELF-HEAL

The Common Marjoram (*Origanum vulgare*) is an aromatic plant that often grows in great abundance on dry hilly pastures, especially in limestone and chalky districts. Its stem is thin and hairy, a foot or more in height; and the leaves are stalked, ovate, blunt, slightly toothed, downy, and about an inch in length. The flowers, which bloom from July to September, are of a rosy purple colour, in numerous globular clusters, the whole inflorescence forming a

leafy panicle. The overlapping bracts are about as long as the calyx, and usually tinged with red or purple; the calyx has five, short, equal teeth, and is very hairy in the throat; the corolla is about twice the length of the calyx, and has four lobes, the upper of which is a little broader than the others; and the stamens are in two pairs, one pair longer than the other. It will be noticed that some of the flowers are larger than others, and that these are perfect, while the smaller ones have no stamens.

In the same order (*Labiatæ*) there is the Self-Heal (*Prunella vulgaris*), a very common plant in moist meadows, flowering from July to the end of the summer. The lower portion of the stem of this plant usually rests on the ground and roots at the nodes, but from this arises the erect branches, four to ten inches high, bearing pairs of oval or oblong, slightly-toothed leaves; and a dense terminal spike of whorled flowers immediately above the last pair. The lipped corolla is of a violet or purple colour, usually about half an inch long. During the flowering stage the spike is very short, but as the fruits ripen it lengthens out to about an inch and a half or two inches.



THE RIBWORT PLANTAIN.

Coming now to the Plantains (order *Plantaginaceæ*) we have two species to note, both of which are very abundant on pasture land. One is the Greater Plantain (*Plantago major*)—a very low plant, with a short, thick rootstock, and a radical cluster of spreading or ascending leaves with grooved stalks. These leaves are ovate, nearly as broad as long, and traversed by five, seven, or nine strong parallel veins which converge into the stalk at the base. Each little flower of the long, slender spike has four sepals; a

corolla with a tube and four spreading lobes; and four stamens that project beyond the corolla. The fruit is a small capsule which splits transversely when ripe. The plant flowers from June to August.

The other is the Ribwort Plantain (*P. lanceolata*), a somewhat similar plant, the leaves of which are narrow, tapering at both ends, with three or five strong, parallel ribs. Each flower-stalk bears a globular or oval spike from half an inch to an inch in length. This species also flowers from June to August.



THE BUTTERFLY ORCHIS



1. Cat's-Tail Grass. 2. Meadow Barley.

There are a few summer-flowering species of Orchids that are more or less common in fields and pastures. One of these is the Marsh Orchis (*Orchis latifolia*), a plant so closely resembling the Spotted Orchis (p. 277) that it is sometimes regarded as a variety of the latter. Its tubers are palmately divided; and its stem,

which is hollow, is usually from twelve to eighteen inches high. The leaves are large, sometimes spotted; and the spike of flowers is large, with leafy bracts longer than the ovaries. The flowers vary in colour from white to a deep purple, have a spur usually thicker than that of the Spotted Orchis, and a lip indistinctly divided into three lobes, with its sides curved backwards. The flower, which is represented on , grows in moist meadows, marshes, and on moors, flowering during June and July.



Rye Grass or Darnel.



SHEEP'S FESCUE.

Another species—the Butterfly Orchis (*Habenaria bifolia*)—has (usually) undivided tubers; a stem from six to twelve inches high with two broad leaves near the base, and surrounded below by a few sheathing scales; and a rather loose spike of white or greenish

flowers with narrow bracts about as long as the ovaries. The petals and upper sepals are arched, the lateral sepals spreading, the lip narrow and undivided, and the spur about twice as long as the ovary. This flower is not uncommon in moist meadows, where it blooms from June to August. A large variety, with greener flowers, is sometimes known as the Great Butterfly Orchis.

A considerable number of summer-flowering grasses are more or less common in fields and meadows. We have not space for the descriptions of these, but introduce illustrations of a few, including the Cock's-foot Grass (*Dactylis glomerata*) which appears on Plate IV.

XV

BOGS, MARSHES AND WET PLACES—SUMMER

The Crowfoot group of the *Ranunculaceæ* contains two bog-plants popularly known as Spearworts on account of their spear-like leaves. One of these—the Lesser Spearwort (*Ranunculus Flammula*)—is abundant in wet places, especially the edges of muddy pools and ditches, where its buttercup-like flowers may be seen from June to September. It is a slender, smooth plant, with a branched stem, more

or less decumbent at the base, from four to twelve inches high. Its leaves are narrow-oval in form, stalked, and either slightly toothed or quite entire; and the yellow flowers are about half an inch in diameter, on long peduncles.

The other is the Greater Spearwort (*R. Lingua*), a much larger species, varying from two to four feet in height, and flowering during the same months. It has stout, hollow, erect stems which throw off whorls of root fibres from the lowest joints; and the glossy, yellow flowers vary from one to one and a half inches in diameter. This species is not nearly so common as the other, but occurs more or less in most parts of Britain.

Taking next the cruciferous plants (*Cruciferæ*), we have first to note a few species of the *Nasturtium* genus, including the Water-cress and the Yellow-cress. These are all smooth plants, with small yellow or white flowers. They may be distinguished from other crucifers by their loose calyx; simple, rounded stigma on a very short style; and their oblong or narrow pods with the seeds arranged in two rows on each side of the membranous partition. The species with which we are at present concerned are:—

1. The Water-cress (*Nasturtium officinale*).—A succulent plant, with a branched stem rooting at the base, growing freely in ditches, shallow streams and muddy places, and flowering from May or June to the end of the summer. Its leaves are pinnately divided into from seven to eleven wavy or slightly-toothed segments, the terminal one of which is usually larger than the others and nearly round. The flowers are small, white, in short, crowded racemes; and the pods are spreading, more than half an inch long.


3.
4.
2.
1.



Plate V.

FLOWERS OF BC

1. Marsh Gentian.
2. Marsh Marigold.
3. Marsh Orchis.
4. Marsh Mallow.
5. Marsh Vetchling.
6. The Marsh St. John's-wort.
7. Bog Pimpernel.



THE LESSER SPEARWORT.

2. The Marsh Yellow Cress (*N. palustre*), common in muddy places.—A slender plant with a fibrous root, and pinnate leaves with irregularly-toothed segments which are smaller towards the base. The flowers are yellow, about an eighth of an inch in diameter, with petals no longer than the sepals. They bloom from June to September. The pods are oblong, swollen, slightly curved, a quarter of an inch long.

3. The Amphibious Yellow Cress (*N. amphibium*).—An erect plant, two or three feet high, with fibrous root and creeping runners, flowering from June to

September, moderately common on the banks of muddy streams. Its leaves are narrow-oblong, three or four inches long, deeply toothed, or cut into narrow lobes; and the flowers are yellow, similar to those of the other species, and similarly arranged, but with petals twice as long as the sepals. The pods are broad, only about a sixth of an inch long, with a rather long style.

In the marshes of the South of England we may often see the Marsh Mallow (*Malva officinalis* or *Althæa officinalis*), of the order *Malvaceæ*, flowering during August and September. Its stem is hairy, with erect flowering branches two or three feet high; and the leaves are shortly stalked, thick, velvety, broadly ovate, and sometimes divided into three or five lobes. The flowers are shortly stalked in the axils of the upper leaves, or sometimes collected into a terminal raceme. Round each one is a whorl of several narrow bracts, shorter than the calyx, and united at their bases. The calyx is five-lobed; and the corolla consists of five broad, rose-coloured petals. This plant is shown on Plate V, Fig. 4.



THE GREAT HAIRY WILLOW-HERB.

The Marsh St. John's-wort (*Hypericum Elodes*—order *Hypericaceæ*) is a somewhat shaggy little plant, common in the bogs of many parts of Britain, more especially in West England and Ireland. It varies from a few inches to a foot in length; with prostrate stems rooting at the base; and rounded, opposite leaves without stipules. Both stem and leaves are clothed with white, woolly hairs, the latter on both surfaces. The flowers, which bloom during July and

August, are of a pale yellow colour, and form a few-flowered, terminal panicle. They have five small, oval sepals, fringed with little red-stalked glands; five petals, about three times as long as the sepals; and many stamens, united to more than half way up into three bundles. (See Plate V, Fig. 6.)

The Blue Marsh Vetchling or Marsh Pea (*Lathyrus palustris*—order *Leguminosæ*) is occasionally to be met with in boggy places, flowering from June to August. It is a smooth plant, with a weak, winged stem, two or three feet long; and pinnate leaves consisting of from two to four pairs of narrow, sharp leaflets, and terminating in a branched tendril. At the base of each leafstalk are two narrow, half arrow-shaped stipules. The flowers are of a bluish purple colour, and are arranged in one-sided racemes, of from two to six flowers on long stalks. The pods are smooth and about an inch in length. This plant is represented on Plate V, Fig. 5.



THE PURPLE LOOSESTRIFE.

Some of the Willow-herbs (*Onagraceæ*) are very partial to wet and boggy places. A few species of other habitats are described in Chapters X and XI, and these, together with the members that come within the range of the present chapter, are readily distinguished by their willow-like leaves and the very

long inferior ovaries of their flowers. We shall here note three species—

1. The Great Hairy Willow-herb or Codlins and Cream (*Epilobium hirsutum*).—A large, erect, hairy plant, from three to six feet high, with numerous underground suckers, and a stout, round, branched stem. Its leaves are opposite, sessile, often clasping the stem, narrow, and finely toothed. The flowers are nearly an inch in diameter, of a deep rose colour, arranged in terminal, leafy racemes. They have four broad, notched, spreading petals; eight erect stamens; and a four-lobed stigma. The plant is common in wet places, and flowers during July and August.

2. The Narrow-leaved or Marsh Willow-herb (*E. palustre*).—A smaller plant, seldom exceeding eighteen inches in height, frequent in bogs and marshes, flowering during June and July. Its stem is round, with two lines of downy hairs on opposite sides; and its leaves are sessile, opposite, very narrow, tapering towards the base, and sometimes slightly toothed. The flowers are small, pink, nodding when in bud, arranged in a terminal raceme. Both flowers and fruit resemble those of the last species except that the stigmas of the former are not divided.

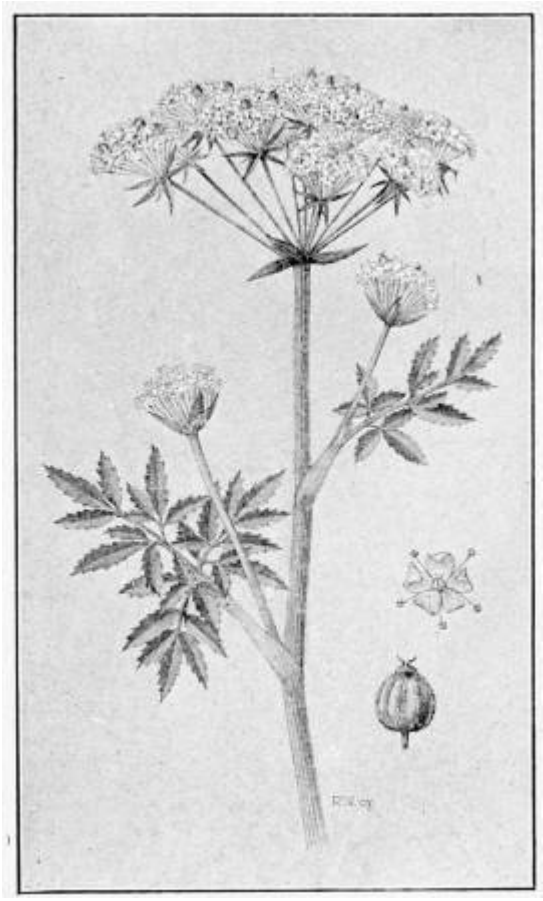
3. The Square-stalked Willow-herb (*E. tetragonum* or *E. adnatum*).—A similar plant, from one to two feet high, common in bogs and ditches, and easily distinguished from other species of the genus by the four angles of the stem formed by the downward continuation of the margins of the leaves. The flowers are small, in terminal, leafy racemes, and erect when in bud. The petals are of a rose-pink colour, deeply notched; and the stigma is not divided. This species flowers in July and August.

Our next flower is the beautiful Purple Loosestrife (*Lythrum Salicaria*—order *Lythraceæ*), which is abundant in the marshes, ditches, and wet places of most parts of Great Britain. It has a creeping rootstock; a stout, erect, slightly-branched, four-angled stem, from two to four feet high; and sessile, narrow, clasping, entire, acute leaves, two or three inches long, arranged in opposite pairs or in whorls of three or four. The flowers are of a reddish purple or pink colour, nearly an inch across, arranged in whorls on a long, tapering, leafy spike. They have a toothed and ribbed, tubular calyx, with broad inner, and narrow outer segments; oblong, wavy, wrinkled petals; twelve stamens in two whorls of different lengths; and a superior ovary. The time of flowering of this species is July to September.

We have now to note several species of umbelliferous plants that grow in bogs and other wet places. The general features of the order (*Umbelliferæ*) will be found on p. 167, and the reader should refer to these, if necessary, before attempting to identify the following:—

The Procumbent Marsh-wort (*Helosciadium nodiflorum* or *Apium nodiflorum*) is a creeping plant, abundant in ditches and other wet places, rooting at the base, with erect flowering stems that are sometimes very short, but often reach a height of three feet. The whole plant is smooth, with hollow stems; pinnate leaves with from three to nine or more pairs of ovate, bluntly-toothed leaflets; and almost sessile umbels of small, white flowers either opposite the leaves or in the angles of the upper branches. These umbels are compound, with about five or six rays, usually without primary bracts, but with several, narrow, secondary ones. The petals

have their points turned inwards; and the carpels are oval, each with five narrow ribs. This plant is commonly seen growing in company with the Water-cress and the Brooklime, and blooms in July and August.

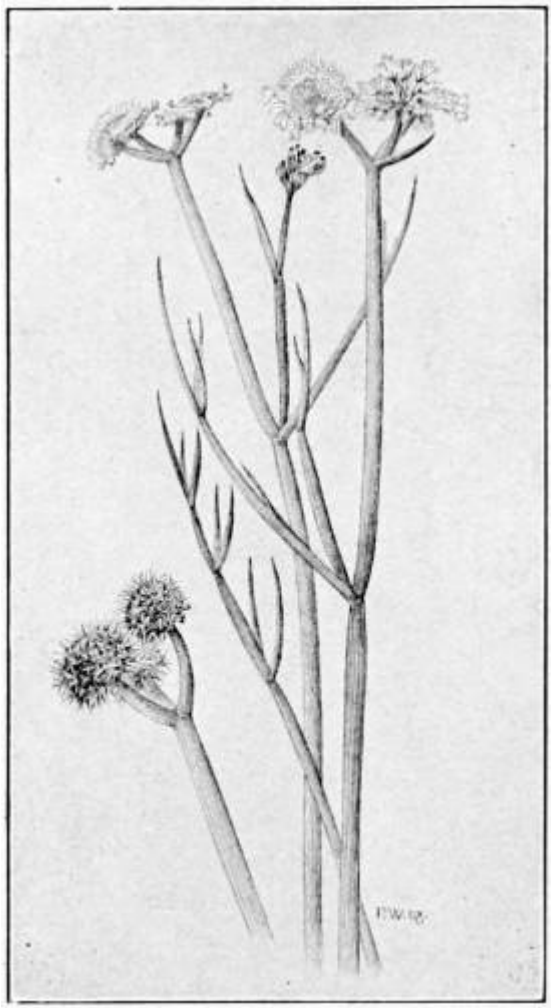


THE WATER HEMLOCK.

In ditches we occasionally meet with the Water Hemlock or Cowbane (*Cicuta virosa*)—a tall plant, from three to four feet high, bearing large, flat

umbels of small, white flowers from June to August. Its stem is hollow, furrowed, and branched; and the leaves are large, twice pinnate or ternate, with lanceolate, acute leaflets, generally over an inch in length, the margins serrate or (sometimes) doubly serrate. Comparing this plant with the Common Hemlock (p. 169), we should note that the secondary bracts of the latter are three in number, almost invariably turned to the outside; and that its calyx teeth are very indistinct, while in the present species they are prominent above the ovary.

Next follow three species of Water Dropwort (genus *Œnanthe*)—smooth plants, with much-divided leaves and compound umbels of white flowers, with secondary, and sometimes also primary, narrow bracts. In all three species the central flowers of each secondary umbel are perfect and shortly stalked, while the outer ones are on longer stalks, and usually staminate. The petals are notched, with points turned inwards; and the fruits have two rather long styles, are crowned by the five minute teeth of the calyx, and their carpels have each five blunt ribs. The three species referred to are:—



THE COMMON WATER DROPWORT.

1. The Common Water Dropwort (*Œ. fistulosa*).—An erect plant, from two to three feet high, with a fleshy, fibrous root; creeping runners; and a thick, hollow, slightly-branched stem. Its radical leaves are bipinnate, with segments cut into three or five narrow lobes; and the stem leaves have long, hollow

stalks, with a few narrow segments at the top. The umbels have from three to five rays, usually with no primary bracts, and a few, narrow secondary ones.

2. The Hemlock Water Dropwort (*Œ. crocata*) is a larger plant, from two to five feet high, with a tuberous root and a thick, branched stem. Its leaves are bipinnate, with stalked, shining leaflets that are irregularly cut. The umbels are on long stalks, and have nearly twenty rays, several narrow secondary bracts, and sometimes a few primary ones. The middle flowers of each secondary umbel are perfect and almost sessile, but the outer ones are stalked and staminate.

3. The Fine-leaved Water Dropwort (*Œ. Phellandrium*) grows from one to four feet high, and has an erect, creeping or floating stem with runners at the base. The upper leaves are bipinnate, with small, cut segments; and the submerged ones are deeply cut into very narrow, almost hair-like lobes. The umbels are small, on short stalks in the angles of the branches or opposite the leaves. They have about ten rays, narrow secondary bracts, but no primary ones.



THE MARSH THISTLE.

All three of the above species flower from July to September.

Next follow a few composite flowers (order *Compositæ*), the first of which is the Marsh Thistle (*Carduus palustris*) that varies from two to eight feet in height, and bears dense clusters of purple (occasionally white) heads during July and August. Its stem is stiff, hollow, slightly branched, and thickly covered with very prickly wings that are continuous with the margins of leaves above them.

The leaves are narrow, wavy, deeply divided into prickly lobes, with scattered hairs on both surfaces; the lower ones often seven or eight inches long; and the upper much smaller and narrower. The flower-heads are ovoid, surrounded by an involucre of many closely-overlapping bracts with prickly tips.

The two Bur Marigolds (*Bidens*) are more or less common in marshes and other wet places. They are both smooth plants with opposite leaves, and hemispherical heads of yellowish flowers surrounded by two or three rows of bracts, the outer of which are spreading. The receptacle is flat, with membranous scales between the florets; and the fruits are crowned by from two to five stiff, prickly bristles. The more abundant of these is the Nodding Bur Marigold (*B. cernua*), a stout plant, from one to two feet high, distinguished by its narrow, entire, sessile leaves, and its drooping flower-heads. The other—the Trifid Bur Marigold (*B. tripartita*)—has three-cleft, stalked leaves, and heads erect or only slightly drooping.



THE BROOKLIME.

The Common Ragwort of waste places, described on p. 187, is represented in marshes and wet places by a very similar plant called the Marsh Ragwort (*Senecio aquaticus*), which varies from one to three feet in height, and flowers in July and August. Its stem is more slender than that of *S. Jacobæa*, and is usually more branched. The leaves are either deeply toothed, or pinnately cut into segments which decrease in size towards the base. The yellow flower-heads are not so densely crowded as in the Common Ragwort, and have longer stalks.

The *Scrophulariaceæ* contains three common plants of the *Veronica* genus that grow in wet places. All three are similar in that they have opposite leaves; a corolla with a short tube, and four spreading limbs, of which the lowest is narrowest; two stamens; and a capsular fruit, flattened at right angles to its partition, opening by two valves, and containing a few seeds.

One of these is the Marsh Speedwell (*Veronica scutellata*), abundant in the marshes and ditches of most parts of Britain. It has a weak, straggling stem, from four to eight inches high, with creeping runners at the base; narrow, smooth, sessile leaves, either uncut or only slightly toothed; and slender racemes of pale pink or white flowers on axillary peduncles arranged alternately, there being only one raceme at each node.

The second is the Water Speedwell (*V. Anagallis*), a smooth plant, varying from six inches to two feet high, abundant in marshes and ditches, bearing small lilac or white flowers in July and August. Its stem is stout, succulent, hollow, erect, and slightly branched; the leaves narrow, acute, toothed, sessile, sometimes clasping the stem; and the racemes axillary and opposite. The flowers are only a fifth of an inch across.

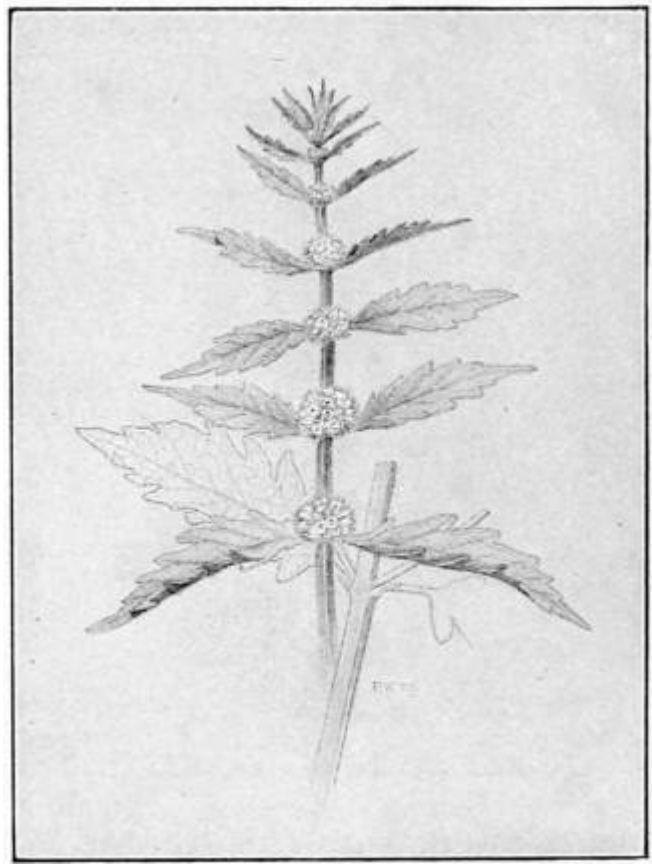


THE WATER FIGWORT.

The third is the Brooklime (*V. Beccabunga*), a very abundant plant commonly seen growing in ditches in company with the Water Cress and the Marsh-wort. It is a smooth plant, with a stem from one to two feet long, procumbent at the base and rooting at the joints; erect, succulent flowering branches; thick, elliptical, blunt, slightly-toothed leaves on short stalks; and opposite, axillary racemes of blue (occasionally pink) flowers about a third of an inch across.

Two of the Figworts, belonging to the same order

(*Scrophulariaceæ*), are abundant in wet places all over Britain. They are both tall erect plants, with opposite leaves, and peculiar greenish brown or dull purple flowers. In both the corolla is almost spherical and shortly lipped. Two of the five lobes form the upper lip; two are at the sides; and the other, forming the lower lip, is turned down. There are five stamens, four of which are fertile and turned down, while the fifth is barren and scale-like, under the upper lip of the corolla.

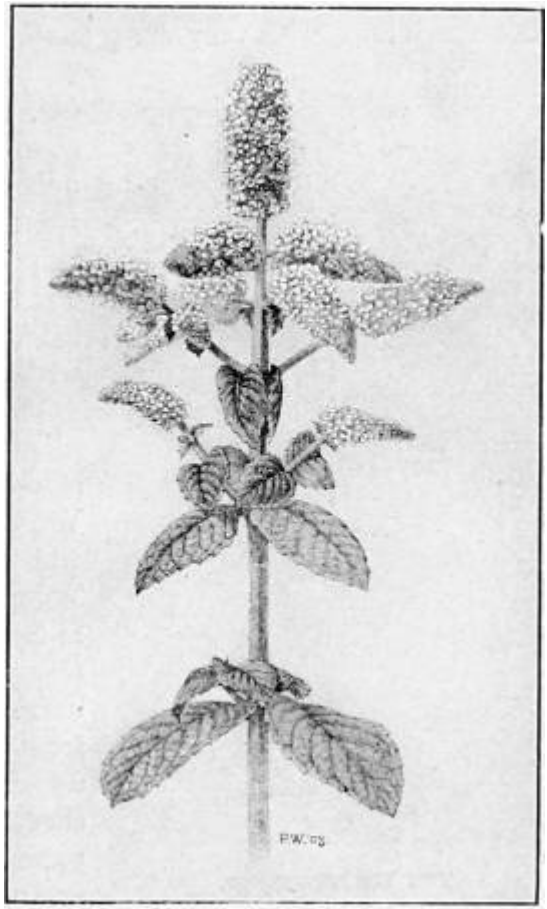


THE GIPSY-WORT.

One species—the Water Figwort (*Scrophularia aquatica*)—grows in marshes and on the banks of ditches and streams. It has a stout, angular stem, the angles of which are drawn out into narrow wings; smooth, opposite, blunt leaves, cordate at the base, with crenate or toothed margins; and long, narrow panicles of flowers with blunt bracts. The five lobes of the calyx are fringed with a conspicuous, transparent, membranous border.

The other is the Knotted Figwort (*S. nodosa*), which is much like the last, but emits a disagreeable odour, and may be further distinguished by the little green, fleshy knots of its rhizome. Its stem is sharply four-angled, but not winged; its leaves are acute, and doubly toothed; and the panicle has small, narrow, sharp bracts.

Passing now to the order *Labiatæ*, we come first to the Gipsy-wort (*Lycopus europœus*), an erect, branched, slightly hairy plant, from one to three feet high, bearing dense whorls of small, white, sessile flowers from June to September. The calyx has five equal teeth with stiff points; and the corolla, which is only slightly longer than the calyx, has four nearly equal lobes. This plant is abundant in most parts of Britain, and is generally seen on the banks of ditches.



THE ROUND-LEAVED MINT.

In the same order we have the Mints (genus *Mentha*) —strongly-scented plants with creeping rootstocks and runners; and small flowers in dense, axillary whorls, or in terminal spikes or clusters. In all the calyx has five equal teeth; and the corolla is bell-shaped, with a short tube, and four lobes of which the upper is broader. There are four erect, equal stamens; and the fruit consists of four small, smooth

nuts. Three species, more or less abundant, occur in marshy or other wet places. They are:—

1. The Round-leaved Mint (*Mentha rotundifolia*).—A moderately common, erect, hairy plant, from one to three feet high, with a powerful but hardly agreeable odour. Its stem is green, hairy, and branched; and the leaves are sessile, broadly ovate or round, blunt, wrinkled, green above, and whitish and shaggy beneath. The flowers are small, lilac (occasionally white), in dense, cylindrical, leafy spikes from one to two inches long. The bracts are rather narrow and sharply pointed, and the corolla is hairy. The time of flowering is August and September.

2. The Water Mint (*M. aquatica*).—An abundant marsh plant, from one to three feet high, flowering from July to September, possessing a strong, pleasant odour. Its stem is much branched, generally clothed with soft hairs; and its leaves are stalked, ovate, serrate, the upper ones passing into bracts which are shorter than the flowers. The latter are lilac, and form dense, terminal, oblong or globular clusters, with, frequently, two or three dense, axillary whorls beneath. The calyx is tubular, about an eighth of an inch long, with very sharp teeth.

3. The Marsh Whorled Mint (*M. sativa*).—A very similar plant, common in wet places, flowering during July and August. It grows from two to five feet high; and its elliptical, toothed leaves are hairy on both sides. The flowers are lilac, in dense, axillary whorls, without any terminal cluster.

There is yet another marsh plant of the *Labiatæ* to be considered, and that is the Marsh Woundwort (*Stachys palustris*), which is very much like the Hedge Woundwort described on p. 199. It has a stout, hollow, hairy stem, from one to three feet high; and

narrow, coarsely-toothed leaves, from two to four inches long, the upper ones sessile and the lower shortly stalked. The flowers are pale purple or dull, light red, arranged in whorls of from six to ten in the axils of the upper leaves. The calyx is bell-shaped, with ten ribs and five long, acute teeth; and the lower lip of the corolla has its side lobes turned back.



THE FORGET-ME-NOT.

We now reach the interesting *Myosotis* genus of the *Boraginaceæ*, containing the favourite Forget-me-not and the similar Scorpion-grasses. They are all rather low and weak plants, with small, sessile, narrow leaves; and small flowers in one-sided, curved racemes without bracts. The calyx is cleft into five; and the corolla has a short tube, partially closed by five little scales, and five spreading or concave lobes. The stamens are enclosed in the tubes of the flower. Three species are common in wet places. They are—

1. The Forget-me-not (*Myosotis palustris*).—An abundant plant, growing to a foot or more in height, and bearing, from June to August, bright blue flowers, nearly half an inch across, with a yellow centre. It has a creeping rootstock, with runners, and rather weak ascending stems clothed with spreading hairs. The leaves are blunt, and often covered with hairs that lie close against the surface. The calyx is divided to about a third of its length into short, triangular teeth, and is covered with closely-pressed hairs.



The Water Pepper or Biting Persicaria.

2. The Creeping Water Scorpion-grass (*M. repens*).—A very similar plant, sometimes regarded as a variety of the last. Its stock emits leafy runners above the ground, and the stem is more hairy. The flowers, too, are of about the same size, but of a sky-blue colour, and their stalks are longer, bending downwards when in fruit. The calyx is divided to about the middle into narrow teeth.

3. The Tufted Water Scorpion-grass (*M. cæspitosa*).—Also a similar plant, often regarded as a variety of *M. palustris*; but its flowers are only about half the size, of a sky-blue colour, with narrow calyx teeth almost as long as the corolla. It is of a paler green colour,

and the stems are tufted by a free branching at the base.

All three of these flower at the same time, and grow in similar situations. Several intermediate forms occur, and thus it is often a difficult matter to distinguish between them.

We must here mention the Butterwort (*Pinguicula*) as a summer-flowering plant of marshy places; but this is a carnivorous species; and as such is described, together with other plants of similar habits, in Chapter XXIV.

In most parts of Britain we may meet with the pretty little Bog Pimpernel (*Anagallis tenella*) of the *Primulaceæ*. It is a delicate, creeping plant (see Plate V, Fig. 7), only about three or four inches long, with a slender, decumbent stem; and very small, opposite, rounded leaves on short stalks. Its flowers are funnel-shaped, of a pale pink colour, on long, slender, erect, axillary peduncles. The calyx is cut into five pointed lobes; and the corolla is deeply cleft into five segments which are much longer than the calyx. The fruit is a globular capsule that splits transversely into two hemispheres, like that of the Scarlet Pimpernel.

Ditches are frequently quite overgrown with the Water Pepper or Biting Persicaria (*Polygonum Hydropiper*), which is very much like the Spotted Persicaria (p. 205) of the same order (*Polygonaceæ*), but is much more slender, is creeping and rooting at the base, and more or less biting to the taste. Its stem is freely branched, from one to three feet high; its leaves narrow and wavy, with membranous stipules much fringed at the top; and the little pinkish-green flowers are in slender, drooping, interrupted spikes, leafy at the base.

Of the *Orchidaceæ* we shall note here but one species —the Marsh Helleborine (*Epipactis palustris*), which is widely distributed, and really abundant in places, flowering during July and August. It is very much like the Broad-leaved Helleborine described on p. 308, and represented on Plate II, but is not so tall, being only about a foot high, and its leaves are narrow. The flowers, too, are fewer than in the Broad-leaved Helleborine, and the raceme is not one-sided. The sepals are narrow, of a pale green colour, striped with red or purple; and the petals are white, striped with red at the base. The lower lobe of the lip is blunt and thick; and the bracts are shorter than the flowers.

Rushes and Sedges are so abundant in marshes and other wet places that they form quite a characteristic feature of these localities; and the number of common species is so large that we must necessarily confine our attention to a very small proportion.

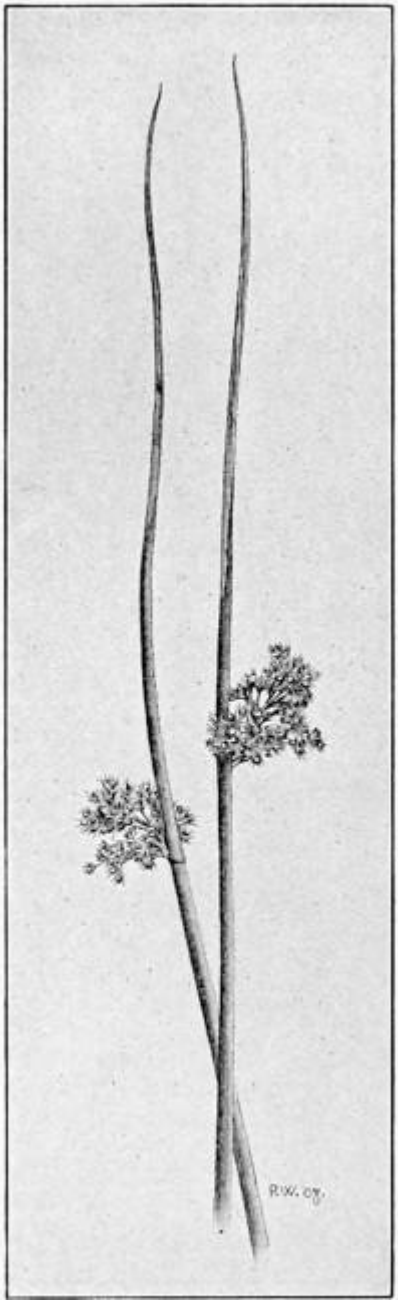
The Rushes, which constitute the order *Juncaceæ*, are stiff, smooth plants, often of such social habits that they cover large patches of wet or watery soil. Their stems are usually erect, and seldom branched; and their stiff, smooth leaves are frequently cylindrical, like the stems, with a soft, pith-like tissue within, but occasionally flat and narrow like those of grasses. The flowers are perfect, with a regular, inferior perianth of six dry segments; and they have generally six stamens, a three-celled ovary, and three slender stigmas. They are very small, either separate or in clusters; and each flower or cluster has a dry, sheathing bract at its base.



THE BOG ASHPHODEL.

The pretty little Bog Asphodel (*Narthecium ossifragum*) shall first receive our attention because botanists are not yet in agreement as to its correct position among the monocotyledonous plants. It is

certainly allied to the rushes, but on account of its larger and more succulent flowers it is often included among the lilies. It has a creeping rootstock, and stiff, erect stems from six to ten inches high. Its bright yellow, starlike flowers form a stiff, terminal raceme, with a bract at the base, and another one above the middle of each pedicel. The segments of the perianth are about a third of an inch long, yellow above and greenish below. The stamens are a little shorter than the perianth segments; and their filaments are clothed with white woolly hairs. This plant is common on wet moors and in mountain bogs, flowering from June to August.





THE COMMON RUSH.

The Common Rush (*Juncus communis*) is a very abundant species, to be found in almost all wet and marshy places, flowering during July and August. Its stems are round, leafless, soft, faintly furrowed, solid, with a continuous pith. They are from one to three feet high, and are sheathed at the base by a few brownish scales, but the plant has no true leaves. Most of the stems bear a panicled cluster of green or brown flowers about six inches from the top. These panicles are very variable in form and size, being either loose or dense, and varying from one to three inches in diameter.

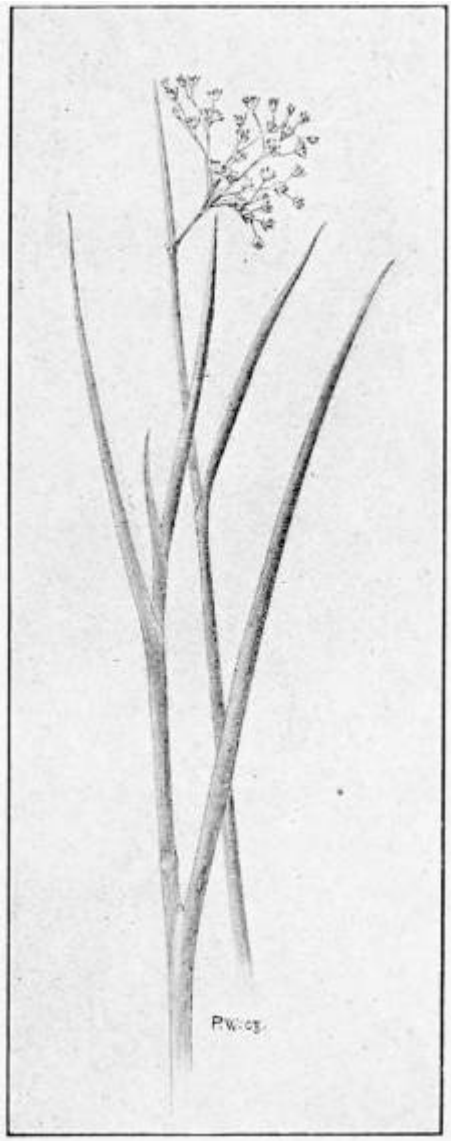
The Hard Rush (*Juncus glaucus*) is a very similar plant, flowering at the same time; but its stem is slender, rigid, deeply furrowed, with the pith interrupted by air spaces. It is generally from one to two feet high; and, like the last species, has no true leaves. The panicle is looser than that of *J. communis*, with fewer and larger flowers; and it is never more than two or three inches below the top of the stem.

A few of the Rushes form a group known collectively as the Jointed Rushes, because their cylindrical or slightly-flattened, hollow leaves are divided within by transverse partitions of pith which give them a jointed appearance, especially when they are dried. Two or three of the species referred to are very common in wet places. They are very similar in general appearance, and one of them—the Shining-fruited Jointed Rush (*Juncus lamprocarpus*) is selected for illustration.

Another species is the little pale-coloured Toad Rush (*J. bufonis*), which grows to a height of only a few inches. It has tufted stems that branch from near the

base; and its flowers are either solitary or in clusters of two or three.

As regards the Sedges (order *Cyperaceæ*), the species are so numerous that it is impossible to do them justice in a work of this nature.



THE SHINING-FRUITED JOINTED RUSH.

Their stems are solid, usually more or less triangular, not swollen at the nodes as in grasses; and the

sheaths of the leaves which surround the stems are not split. The flowers are in little green or brown spikelets that are either solitary at the top of the stem, or collected into a cluster, spike, panicle, or umbel. Each spikelet is in the axil of a scaly or leafy outer bract, and consists of several scales or glumes, each with a single sessile flower in its axil. The flowers have no perianth, but there are often a few very small scales or bristles at their base. They have two or (generally) three stamens; a one-celled ovary; and a style that is more or less deeply cleft into two or three slender stigmas. The fruit is a small, one-seeded nut, usually flattened in the species which have two stigmas, and triangular where the stigmas are three.



THE COMMON SEDGE.

The reader should make himself thoroughly

acquainted with the above features of the sedges, in order to avoid any confusion with the rushes, on the one hand, and with the grasses on the other; and he must not be led astray by the fact that some of the sedge family are popularly known as rushes.

Of this order the pretty Cotton Grasses (*Eriophorum*) often form a very conspicuous feature of marshes and other wet places. They are tufted or creeping plants with terminal spikelets, very much like those of the other sedges, but their flowers are perfect, and the bristles which represent the perianth grow to a considerable length as the flowering advances, protruding far beyond the overlapping glumes, and at last forming dense tufts of fine cottony hairs.

Two species are decidedly common and widely distributed, more especially the Common Cotton Grass (*Eriophorum polystachyon*), which is often so abundant as to give a general whitish appearance to whole patches of boggy land. It is a creeping plant, with solid, rigid, solitary stems, from six inches to over a foot in height; a few shorter, radical leaves; and a few leaves on the stem. Its spikelets, three to twelve in number, form a terminal cluster, the inner ones sessile, or nearly so, and the outer stalked and more or less drooping. They are at first oval or oblong, about half an inch long; but in fruit, usually in the month of June, they form dense cottony tufts from one to two inches in length.



THE MARSH SEDGE.

The other is the Hare's-tail or Sheathing Cotton Grass (*E. vaginatum*)—a tufted species, common on boggy moors, with many stems which are round below and triangular above, at first about six or eight inches high, but lengthening as the flowering advances. At the top of each stem is a solitary oval spikelet, of a dark brownish-green colour, over half an inch long,

with many straight bristles that eventually form a dense, globular, cottony tuft about an inch in diameter. This is an earlier species, flowering during April and May.

The large genus *Carex* contains many common sedges with grass-like leaves springing from the base or the lower part of the stem. Some of them have a solitary spikelet; others have several spikelets in a terminal cluster or spike, with, sometimes, stalked spikelets below; or they are arranged in a compound spike or panicle. The flowers are all imperfect, without perianth; and the male and female flowers are either in separate spikelets or in different parts of the same one. The glumes overlap all round the axis of the spikelet; there are generally three stamens; and the ovary is enclosed in a little vase-shaped covering with a little hole at the top through which the two or three stigmas protrude.

We give illustrations of two of the commonest species; the Common Sedge (*Carex vulgaris*), which flowers from June to August; and the Marsh Sedge (*C. paludosa*), that flowers in May and June. The former grows to a height varying from six inches to two feet; and the latter to from two to three feet.


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3.



Plate VI.

FLOWERS OF DOWN, HEATH

1. Musk Thistle.
2. Clustered Bell-flower.
3. Spiny Rest Harrow.
4. Hairy Hawkbit.
5. Sheep's-bit.
6. Spotted Orchis.
7. Heath Rush.

XVI

ON HEATH, DOWN AND MOOR

On the exposed and more or less bleak heath, down and moor we do not meet with many species of spring flowers, and for this reason we have included both spring and summer blossoms in the same

chapter.

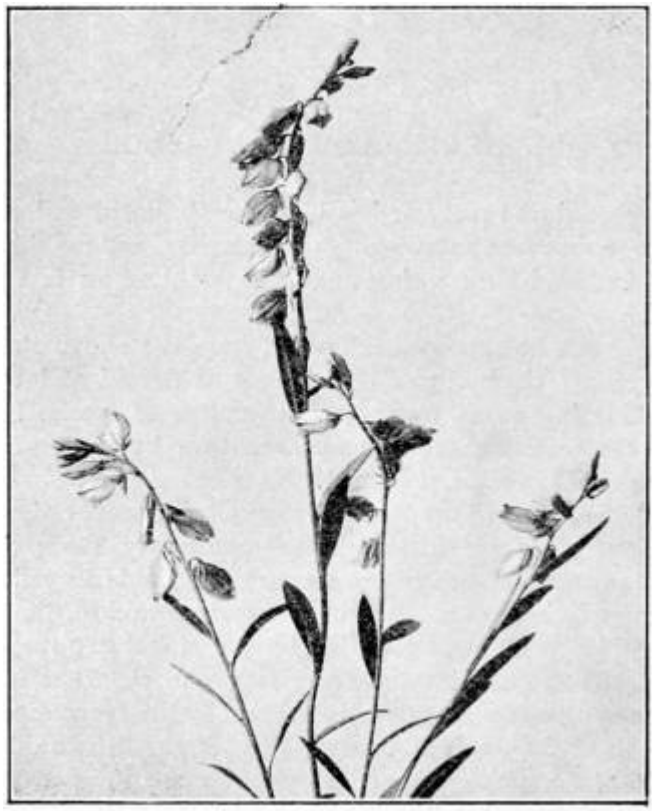
It must not be supposed, however, from the above statement, that we regard these exposed situations as devoid of interest, or even lacking in flowers, for the small number of species flowering early in the season is often compensated for by the profusion in which their blossoms are produced.

The golden blaze of the Furze or Gorse, aided more or less by the similar flowers of its little relative—the Petty Whin, is alone sufficient to add a charm to the scene, while the large yellow blossoms of the Broom often take the place of, or add to, the glorious display, which is frequently varied by the globular flowers of the Whortle, and the catkins and early leaves of the Dwarf Willow. Occasionally the scene is still further varied by the evergreen, needle-like foliage of the Juniper, intermixed with the little axillary catkins; while among the surrounding grass we see the pretty flowers of the little Eyebright; the brown flowers and hairy leaves of the Field Woodrush, often growing as thickly as the grass itself; and the short, stiff leaves and sessile spikelets of the Spring Sedge.

Among the more gaudy flowers we may note the large purple heads of the Musk Thistle, a common plant on the heaths of some southern counties; and in boggy districts we may see the abundant white, silky tufts of the Hare's-tail Cotton Grass; and the flower-clusters of the Yellow Sedge.

These and the few other spring flowers of heaths and moors are described, in their order, among the summer flowers of the present chapter. Some of them are exclusively spring blossoms, and are to be seen only in their fruiting stages during the summer months, but a few continue to bloom after spring has

ended, and even far into the summer. The Furze, which often commences to flower during the first few weeks of the year, may be seen, still in bloom, during July and early August; and the Eyebright may be found in flower even to the beginning of autumn. The Musk Thistle, too, though its first flower-heads may be observed in May, or, sometimes, even in April, will continue producing new flowers well into October.



THE MILKWORT.

A good many species are included in the present

chapter, and most of these, at least, will be easily identified by the descriptions given.

On almost all heaths and downs we may see the pretty little Milkwort (*Polygala vulgaris*)—the only British representative of its order (*Polygalaceæ*), unless we regard some varieties of this variable plant as distinct species, according to the opinions of some authorities. It is a smooth or slightly hairy plant, with a woody stem that gives off several spreading branches varying from two to nine inches in length. The nature of the leaves and the arrangement of the flowers are shown in our illustration. The latter are very variable in colour, ranging from a pure white to lilac and a deep, rich blue; and each has five sepals, of which the two inner ones are wing-shaped, persistent, and coloured like the corolla; and at its base are three bracts, the middle and largest of which is as long as the short pedicel. The petals, three to five in number, are united, smaller than the wing-sepals, and the lowest is keel-shaped. The plant blooms from June to August; and the drooping flowers, though small, are often so abundant as to distinctly modify the general colouring of patches of heath and moor.



THE BROOM.

Two small species of St. John's Wort (order *Hypericaceæ*) are moderately abundant on downs and commons, especially in South Britain. The flowers of this order are all yellow, and may be easily recognised by their stamens, three or five in number, which are so much branched that they give the appearance of a large number of stamens arranged in three or five clusters. In the two species we have to consider these stamens are three in number. One is the Trailing St. John's Wort (*Hypericum humifusum*), a little tufted, prostrate plant, with small oblong leaves marked by minute transparent spots, and by black dots under the margins; and flowers with unequal

sepals. The other is the Small St. John's Wort (*H. pulchrum*) which is erect, from one to two feet high, with cordate leaves that embrace the stem, and panicled flowers which are tipped with red when in the bud. Both species flower during July and August.

Passing now to the *Leguminosæ*, we take first the Broom (*Sarothamus scoparius* or *Cytisus scoparius*)—a smooth or slightly hairy shrub, from two to six feet high, bearing large, yellow flowers during May and June. Its branches are long, erect, angular and green; and the leaves are small, ternate, with obovate, silky leaflets, or sometimes reduced to a single leaflet. The large flowers are either solitary or in pairs, shortly stalked, and arranged in the axils of the leaves of the previous summer. The fruits are black pods, usually more than an inch long, hairy round the edges of the valves, and surmounted at first by a spirally-curved style.



THE FURZE OR GORSE.

The Furze, Gorse, or Whin (*Ulex europæus*) is a bush of about the same size, with more or less erect branches that all terminate in a sharp, rigid point. Sometimes little lanceolate leaves may be seen near the bases of the short branches, but normally all the leaves are reduced to sharp, green spines, about half an inch long. The flowers, usually more than half an inch long, are placed singly in the axils of the thorny leaves of the previous season, and are often so abundant as to form dense, showy clusters. The Furze is abundant in all parts of Great Britain with the exception of North Scotland, and may be seen in

flower from February (or even January if the weather is mild) to July.



THE TORMENTIL.

The Dwarf Furze (*Ulex nanus*), also abundant on the heaths of most parts of Britain, commences to flower in July—just about the time that the last species ceases to produce its blossoms, and continues in bloom almost to the end of the year. It is a much smaller shrub, usually from one to two feet high, of a deeper green colour. Its stem is usually procumbent; its spines weaker, and generally turned downward; and its flowers smaller, and of a deeper, golden yellow.

On heaths and downs of most parts of England and

Scotland we may meet with the Needle Green-weed, Needle Whin, or Petty Whin (*Genista anglica*)—a little spiny shrub, varying from a few inches to two feet in height, with erect stem and spreading branches. Its lower branches are simple, or are reduced to branched thorns, while the upper are compound, bearing small ovate or narrow leaves; and solitary, axillary, pale yellow flowers in short, leafy clusters. This species flowers during May and June.

In the same order (*Leguminosæ*) are two species of Rest Harrow, common on heaths and stony banks. One of these—the Common Rest Harrow (*Ononis arvensis*)—is a very variable plant, with pink or rose-coloured flowers that bloom from June to September. Its stem is sometimes procumbent and rooting at the base, sometimes ascending or nearly erect, and is thinly clothed on all sides by soft, spreading hairs. The leaves are usually trifoliate, with obovate or oblong, toothed leaflets, but the lateral leaflets are often very small or altogether wanting. The flowers are solitary, sessile or shortly-stalked, on short, lateral branches; and the standard (upper petal) is streaked with a darker colour.

The other species, shown on Plate VI, Fig. 3, is the Spiny Rest Harrow (*O. spinosa*), which, however, is sometimes regarded as a variety of the last. Its flowers are very similar in form and colour, and appear during the same time; but the stem is erect, spiny, without runners, seldom more than a foot high, and has two longitudinal rows of hairs.

Passing next to the order *Rosaceæ*, we first note the Dropwort (*Spiræa Filipendula*), of the same genus as the Meadow Sweet, frequently met with on the downs and dry pastures of England and Scotland. Its leaves are mostly radical, three or four inches long,

interruptedly pinnate, with many oval or narrow segments which are themselves pinnately lobed or deeply toothed. At the base of each is a pair of stipules which are attached to the leaf-stalk throughout their length. The flowers, which appear during June and July, are white, and very much like those of the Meadow Sweet (p. 219), but are larger, without scent, and generally pink when in the bud. The height of the plant is usually from twelve to eighteen inches.

In the same order we have the Tormentil (*Potentilla Tormentilla*), which is very abundant on heaths, dry pastures and stony banks, flowering from June to August. This plant has a prostrate (rarely erect) stem, from six to ten inches long, repeatedly forked, and clothed with silky hairs. The leaves are compound, with three or five deeply-toothed leaflets; the lower ones sometimes shortly stalked, but the upper always sessile. The flowers are rather small, yellow, generally with four petals, on slender peduncles arising from the axils of the leaves or from the forks of the stem.

Our last example of the *Rosaceæ* is the Blackberry (*Rubus fruticosus*); but it should be mentioned at once that the popular name of Blackberry embraces quite a number of shrubs, often estimated at some scores of species and varieties. We cannot here, however, attempt to divide and classify the group; but we shall simply point out the features by which the shrubs in question may be distinguished, collectively, from allied shrubs that are not properly included under the same popular name. The stem of the Blackberry grows to from three to twelve feet long, and has stiff or downy hairs in addition to the prickles. It is sometimes quite prostrate, sometimes erect, but more

commonly arched, and rooting at the tips as they bend to the ground. The leaves are very variable, but usually consist of three or five large, ovate leaflets, with toothed edges, more or less downy, having curved prickles along the midrib and stalks. The flowers are white or pink, in terminal panicles, with five free sepals, five distinct petals, and many stamens. The fruit is black, and consists of several one-seeded carpels which do not readily separate from the receptacle when ripe; and the persistent sepals are usually bent downward below it.

Coming now to the *Rubiaceæ*, we have to note four species, all characterised by whorled leaves; a corolla of four, united petals; stamens attached to the corolla; and an inferior ovary, of two carpels, that ripens to a dry fruit. Three of the four belong to the Bedstraw genus (*Galium*), in which the corolla is wheel-shaped. They are:—

1. The Yellow or Ladies' Bedstraw (*G. verum*), very abundant on downs and dry banks, flowering from June to September. It has a prostrate or semi-erect, smooth stem, from six inches to two feet in length; and small, narrow leaves, six to eight in a whorl, generally slightly rough on the edges. The flowers are pale yellow, golden yellow, or greenish, arranged in dense, terminal and axillary panicles. The fruit is small and smooth.

2. The Smooth Heath Bedstraw (*G. saxatile*).—Abundant on downs, flowering from June to August. Its stem is prostrate, smooth, from four to six inches long; and the leaves are generally in whorls of five or six. The flower-stalks are numerous, erect, weak, angled, smooth, each bearing a terminal panicle of many small, white flowers. The fruit is small, with a granulated surface.

3. The Upright Bedstraw (*G. erectum*).—Not so common as the preceding, but often found on downs and hilly pastures, flowering from June to August. It is sometimes regarded as a variety of the Great Hedge Bedstraw (*G. Mollugo*), described on p. 172. Its stem is erect, from one to two feet high; and the leaves, six to eight in a whorl, are very narrow, with marginal prickles pointing forwards. The flowers are white, in a panicle with slender, erect branches; and the fruit is smooth.



THE SMOOTH HEATH BEDSTRAW.

The remaining plant of this order is the Small Woodruff or Squinancy-wort (*Asperula cynanchica*),

which is common in many parts of England and Ireland. Its stem is smooth, sometimes erect with scattered leaves, and sometimes prostrate, leafy and tufted. It varies in length from six to ten inches. The leaves are very narrow, usually four in a whorl, and very unequal. At the upper nodes two of each whorl are often reduced to mere scales, or are absent altogether. The flowers, which appear during June and July, are white or pinkish, and are clustered at the tips of the erect stems. The fruit is small, with a granulated surface.



THE DWARF THISTLE.

The Small Scabious (*Scabiosa Columbaria*), of the order *Dipsaceæ*, is common on the dry heaths of England, and is readily distinguished from the

Devil's-bit Scabious, which it somewhat resembles, by its deeply-divided leaves and pale purple or lilac flowers. Its stem is erect, from one to two feet high. The lower leaves are rather crowded, and usually have a large, oval or oblong, terminal segment, deeply toothed or lobed, and some smaller ones below it. The stem leaves are cut into very narrow segments which are either entire or pinnately lobed. The flowers are in dense, terminal heads, surrounded by a whorl of short bracts, and intermixed with the little, narrow scales of the receptacle, the outer flowers of each head being larger than the others, and very irregular. This plant flowers during July and August.

Of the *Compositæ* we shall first take the Hairy Hawkbit (*Leontodon hirtus*), which is very common on moors in most parts of Great Britain, flowering during July and August. Although known as the *Hairy* Hawkbit, this plant is sometimes quite smooth; more commonly, however, the leaves and peduncles are clothed with thinly-scattered, stiff, forked hairs. Its leaves are all radical, either oblong or very narrow, with coarsely-toothed or wavy margins. The flower-heads are solitary, on peduncles from three to eight inches long, and of a bright yellow colour. Each head is surrounded by a whorl of about a dozen green, smooth bracts, outside which are several shorter ones. All the florets are strap-shaped and perfect; and the fruits, which taper at the top, are mostly crowned by a pappus of feathery hairs as long as the achene itself, with a few shorter ones outside. This species appears on Plate VI, Fig. 4.

We have next to note a few thistles that are more or less common on downs and moors, the first being the Musk Thistle (*Carduus nutans*), common in the South

of England, but much less frequent in the North. It is a stout plant, usually scantily covered with a loose, cottony down, with a furrowed stem from one to three feet high. The leaves are very deeply divided pinnately, very prickly, and extend down the stem in the form of narrow, prickly wings. The flower-heads are very large, of a purple or crimson colour, drooping, usually solitary, but sometimes in loose clusters of from two to four. Each head is surrounded by numerous very narrow, stiff bracts, more or less covered with cottony down. All of these terminate in a sharp prickle which is erect on the inner bracts, but spreading or turned backward in the case of the outer ones. This thistle may be seen in flower from May to October. It appears on Plate VI, Fig. 1.

The next species—the Dwarf Thistle (*Carduus acaulis*)—is found only in the southern and midland counties of England, but is very common on some of the elevated downs of the South-East, especially on chalky soils. It has a very thick and hard rootstock, but hardly any trace of a stem, so that its spreading tuft of radical leaves lie close on the ground, around the large, purple, stemless, and, usually, solitary flower-head. The plant flowers from July to September.



THE CARLINE THISTLE.

The Carline Thistle (*Carlina vulgaris*), as its name shows, does not belong to the same genus as the others, from which it differs principally in having its inner bracts coloured and spreading. It is an erect plant, with a stiff stem, usually branching, from six to eighteen inches high. Its leaves are very prickly, and do not form wings down the stem. The flower-heads are particularly interesting, having much the appearance of everlasting flowers. In fact, the whole plant is of such a stiff and dry nature that it undergoes but little change in appearance when cut and preserved. The outer bracts are leafy and spreading, with strong, prickly teeth or lobes; and the inner ones are very narrow, entire, white or pale yellow, of a chaffy nature and very glossy. The latter

are very sensitive to atmospheric conditions, spreading horizontally when the air is dry, and closing over the florets in humid air; and they respond so readily to the changed conditions that their movements may be watched as they are transferred from warm, dry air to a moist chamber, or *vice versa*. This plant is common on the downs of England and Ireland, and flowers from July to September.

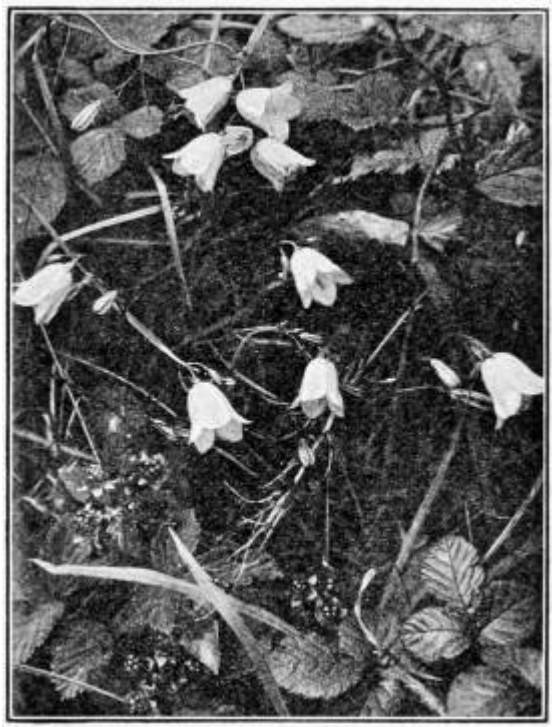


THE COMMON CHAMOMILE.

Our last Composite flower is the Common Chamomile (*Anthemis nobilis*), which is abundant on the downs of the southern counties of England, flowering from July to September. It is an aromatic herb, with a procumbent stem, from six to twelve inches long, and ascending, leafy, flowering

branches. The leaves are bipinnate, slightly downy, with very fine, almost hairlike, segments. The flower-heads are terminal, with a white ray and yellow disc, surrounded by blunt bracts the inner of which have membranous tips. On the receptacle are little broad scales, nearly as long as the disc florets.

On heaths almost everywhere we may see the pretty Roundleaved Bell-flower or Harebell (*Campanula rotundifolia*), which displays its gracefully drooping bells from July to September. It has a slender, smooth, erect or ascending stem, from six to twenty inches high, which is usually branched. Its popular and scientific names both appear to be inappropriate if we examine the plant during its flowering season, for the only leaves then usually observable are the very narrow ones, generally quite entire, attached to the stem; earlier in the year, however, it has a few round or heart-shaped leaves, with long stalks, close to the base of the stem; but these commonly die about the time that the flowers commence to appear. The flowers are sometimes solitary, but often form a loose raceme of several bells.



THE HAREBELL.

The Clustered Bell-flower (*Campanula glomerata*) is common on the downs of most parts of England, and often very abundant in the South. It has a stiff, hairy, erect, angular, unbranched stem, from three to eighteen inches high. On some of the dry, chalky downs of the South the plant is often very dwarfed, being scarcely noticeable among the rather closely-cropped grass. The leaves are oblong or lanceolate, with crenate margins, rough and hairy, the lower ones stalked, but the upper sessile and clasping the stem. The flowers are about three-quarters of an inch in diameter, and form a dense cluster among the upper leaves. The corolla is blue, bell-shaped, with five spreading lobes; and the fruit is a short, broad

capsule, surmounted by the teeth of the calyx, and opens, when ripe, by slits near the base. This species flowers during July and August. It may be identified by reference to Fig. 2 of Plate VI.

The same order includes the Sheep's-bit (*Jasione montana*), also known as the Sheep's Scabious. It certainly resembles a Scabious in general appearance (see Fig. 5 of Plate VI), with its dense clusters of blue or deep lilac flowers, but may be readily distinguished from it by the united anthers of its five stamens, and by the absence of the involucel that surrounds the individual flowers of the Scabious flower-head. The dense cluster of flowers, surrounded by a whorl of many ovate bracts, might also be mistaken for that of a Composite at first sight; but here again we find exclusive distinguishing features, for the flowers of the cluster are not sessile on a common receptacle; and the fruits, instead of being one-seeded achenes, are two-chambered capsules. The plant is from six to twelve inches high; and its leaves are oblong or very narrow, wavy, blunt, and hairy. The flower-heads are hemispherical, about half an inch in diameter. Both calyx and corolla have five narrow, spreading lobes. The plant is common on heaths, and flowers from June to September.



THE CROSS-LEAVED HEATH.

We now come to those interesting plants known collectively as Heaths, and which add so much beauty to our heaths and moors. They belong to the order *Ericaceæ*, and are all readily distinguished by their bushy appearance, hard woody stems, and small, simple leaves arranged in pairs or whorls. The

flowers, too, are very characteristic, each one having an inferior calyx of four sepals; a bell-shaped or pitcher-shaped, persistent corolla, with five lobes; eight stamens free from the corolla; and a four-chambered ovary that ripens to a capsule.

The Cross-leaved Heath (*Erica Tetralix*) is common all over Britain, especially so in the West. It is a wiry little shrub, from a foot to eighteen inches high, much branched at the base. Its leaves are short, narrow, downy above, fringed with stiff hairs, and arranged in whorls of four, each whorl forming a cross. The drooping flowers, which appear during July and August, are usually rose-coloured, occasionally white, and are arranged in close, terminal, one-sided clusters.

The Ciliated Heath (*Erica ciliaris*), perhaps the most beautiful of the British species, is found only in the West of England, but is really abundant on some of the Devon and Cornwall moorlands. It is of a somewhat straggling nature, and its ovate leaves, which are downy above, and fringed with stiff hairs, are in whorls of three or four. The flowers are sometimes nearly half an inch long, of a bright rose or crimson colour, and are arranged in broken, one-sided racemes. The corolla is pitcher-shaped, with four lobes round the narrow mouth. The plant reaches a length of from twelve to eighteen inches, and flowers from June to September.



THE BELL HEATHER OR FINE-LEAVED HEATH.

Our last example of this genus—the Bell Heather or Fine-leaved Heath (*E. cinerea*)—is, perhaps, the commonest of all, for it abounds on the moors and heaths of nearly all parts of Britain. It is a very tough and wiry shrub, from one to two feet high, with narrow leaves in whorls of three or four, and smaller leaves in their axils. The flowers vary in colour, being either purple, crimson, rose, or occasionally white. They are in dense, leafy racemes, not one-sided, but rather regularly whorled. The time of flowering is from July to September.

In the same order is the Common Ling (*Calluna vulgaris*)—a straggling shrub, from one to three feet high, bearing rose-coloured, lilac or white flowers from July to September. This shrub may be identified at once by its leaves, which are very small, and closely overlapping in four rows. Its flowers are small, drooping, shortly stalked, each with two pairs of small bracts at its base; and are arranged in irregular, leafy racemes on the topmost branches.

Still in the same order (*Ericaceæ*), but quite distinct from the Heaths, are a few moorland shrubs the berries of which are largely eaten by the country-folk. They belong to the genus *Vaccinium*, and have scattered, deciduous or evergreen leaves. We have noticed that in the heaths the ovary is superior, but in the present genus it is inferior; that is, it is situated below the calyx and corolla, which parts are attached to its upper border. The calyx has four or five lobes; and the corolla, which is bell-shaped or pitcher-shaped, has the same number of lobes or teeth. The stamens, eight or ten in number, are usually rendered peculiar by the tubular bristles that extend upwards from the anther cells. The berries are globular or nearly so, and contain several seeds. Some species of this genus are rare, but three, at least, may be included here. They are—

1. The Whortleberry or Bilberry (*Vaccinium Myrtillus*).—A smooth shrub, from six to eighteen inches high, common everywhere except in some of the eastern counties, flowering from April to June. Its stem is erect or spreading, branched, green, and sharply angular. The leaves are shortly stalked, ovate, serrate, seldom more than an inch long; and the flowers are nearly globular, with small teeth, drooping on short stalks, and placed singly in the

axils of the leaves. They are of a greenish rose or flesh-colour, often tinged with red, and have a very waxy appearance.

2. The Great Bilberry or Bog Whortleberry (*Vaccinium uliginosum*).—A smaller and more woody shrub, from six to ten inches high, growing only in the moorland bogs of North Britain. Its stem and branches are round or scarcely angular, and usually procumbent and crooked. The leaves are small, obovate or round, entire, thin, deciduous, with the veins strongly marked on the under side; and the flowers are globular, of a pale pink colour, smaller than those of the last species. This species flowers during May and June.

3. The Red Whortleberry or Cowberry (*V. Vitis-idæa*).—A straggling, much branched, and woody shrub, from six to eighteen inches high, found chiefly on the mountainous heaths of the North. Its leaves are evergreen, obovate, dotted beneath, with the margins slightly rolled back; and the flowers are bell-shaped, of a pale pink or flesh-colour, arranged in rather dense, drooping clusters. The latter, which bloom from June to August, are followed by red, globular berries.

On wet, marshy heaths we occasionally meet with the Marsh Gentian (*Gentiana Pneumonanthe*). It is a very local plant, growing chiefly, though not exclusively, in the northern and midland counties of England. Its stem is erect, stiff, leafy and unbranched, usually from six to ten inches high; and its leaves are sessile, linear, obtuse, rather thick, the lower ones broader than the upper. The flowers, which bloom during August and September, are represented on Plate V.



THE EYEBRIGHT.

In the same order (*Gentianaceæ*) is the Autumn or Small-flowered Gentian (*Gentiana Amarella*)—a little erect plant, from three to twelve inches high, common on dry heaths and stony pastures. Its stem is square, very leafy, simple or branched, often of a blue-green or purple colour; and the leaves are sessile, opposite, ovate or lanceolate. The flowers are of a pale purple colour, from half to three-quarters of an inch long, arranged in an oblong, leafy cluster. The calyx is divided quite half way down into five unequal, narrow segments; and the corolla has a broad tube with four or five ovate lobes that spread only in the direct rays of the sun. The time of

flowering is August and September.

One of the Dodders—the Lesser Dodder (*Cuscuta Epithymum*)—is essentially a plant of heaths and moors, where it is parasitic on Heaths, Thyme, and other shrubby plants. It is described in Chapter XXIII, where will also be found a short account of its growth and parasitic habits.

Our only example of the *Scrophulariaceæ* as far as this chapter is concerned—the Eyebright (*Euphrasia officinalis*)—is also a partial parasite, and is referred to, with other plants of the same nature, in Chapter XXIII. It is a little plant, the general appearance of which is shown in our illustration. It varies from one to eight inches high, and bears little lilac, lipped flowers, streaked with purple, with a rather large yellow spot at the base of the lower lip.

One of the Mints—*Mentha Pulegium* (order *Labiatæ*)—well-known as a garden herb under the name of Pennyroyal, is to be found on damp heaths. Though not very common, it is widely distributed, occurring in nearly all parts of Great Britain. It is very aromatic, and is largely cultivated for use as a remedy for colds. The flowers are of a lilac colour, arranged in dense, distant whorls in the axils of the upper leaves. The calyx is downy without, hairy at the throat within; and the corolla has almost equal lobes, the upper of which is notched. The plant flowers in August and September.

In the same order is the Wild Thyme (*Thymus Serpyllum*)—a little, wiry, prostrate plant, with an aromatic odour, very abundant on the dry heaths of most parts of Britain, flowering from June to August. Its stem is thin but hard, and much branched, the numerous flowerless branches usually forming a dense tuft close to the ground. The flowers are

purple, in whorls of five or six in the axils of the upper leaves. The calyx is lipped, of a deep red colour, and its mouth is closed with hairs after the corolla is shed. The corolla is of a paler colour, and indistinctly divided into two lips, the upper of which is erect and notched, while the lower is cleft into three lobes. The time of flowering is from June to August.

The Wood Sage or Wood Germander (*Teucrium Scorodonia*) is very abundant on damp heaths, and is also commonly seen in hedgerows and on banks, especially in hilly and heathy districts. It is an erect plant, from one to two feet high, with a hard, hairy, slightly-branched stem. Its paired leaves are stalked, ovate or cordate, toothed, downy, and much wrinkled like the leaves of the true Sages. The flowers are yellowish white, arranged in pairs on terminal and axillary racemes, with a small bract at the foot of each short flower-stalk. Although not very conspicuous, they are very attractive to bees, providing abundance of nectar. There is no true upper lip to the corolla, the upper part being deeply cleft, with a small lobe on each side; and the stamens and stigma project beyond the petals. This plant flowers during July and August.



THE WILD THYME.

On moist heaths, especially in the west of Britain, we commonly meet with the Lesser Skull-cap (*Scutellaria minor*), another of the Labiates. It is a little plant, seldom more than six inches high, with pale pink flowers that bloom from July to October. The stem is rather slender, and branched; and the paired leaves are broadly ovate below, narrower above, obtuse, very shortly stalked, and either entire or slightly toothed. The flowers are only a quarter of an inch long, shortly stalked, and usually placed singly in the

axils of the leaves. The calyx has two lips, the upper of which bears, on the middle of its back, a prominent hollow scale; and the corolla has a long tube with two small lips, the lower of which is divided into three lobes.

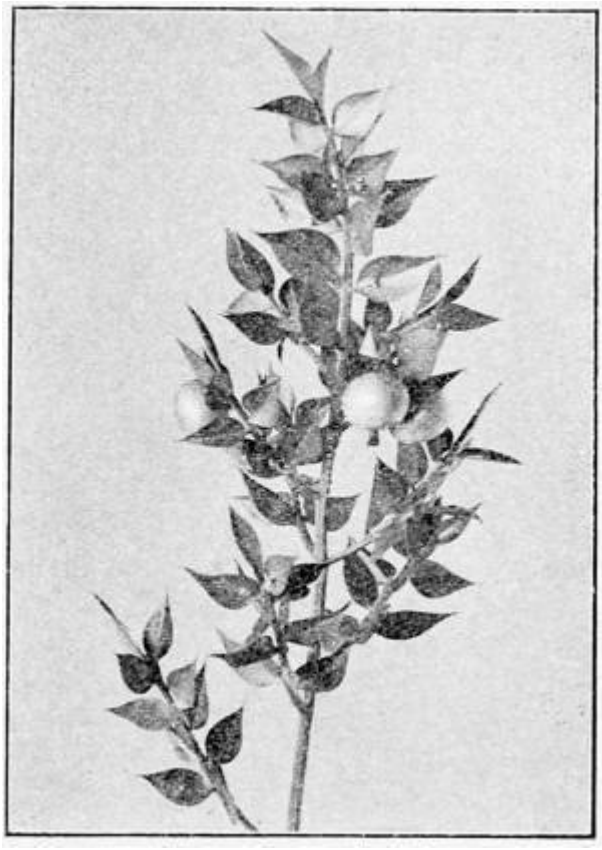


THE AUTUMNAL LADY'S TRESSES.

The Dwarf Silky Willow (*Salix repens*—order *Salicaceæ*) is very common on heaths. It is a small,

straggling shrub, from one to three feet high, sometimes erect, but more commonly procumbent and rooting at the base, with slender branches. Its leaves are often less than an inch in length, oblong or narrow, with recurved margins, shining above and silky below. When young, the leaves are silky on both sides; and the young twigs and the buds are also clothed with a silky down. The flowers are imperfect, and are in short, sessile, erect, oblong catkins, which appear in April and early May, before the leaves. The male and female flowers grow on different shrubs; but in both cases the catkins are about half an inch long, with a few leafy bracts at the base, and the flowers are intermixed with silky scales. The capsules split when ripe, liberating numerous minute seeds that are tufted with long, white, silky hairs.

The Juniper (*Juniperus communis*), one of the few British conifers, is not uncommon on dry, gravelly or chalky downs, more especially in the North. It is a profusely-branched, evergreen shrub, either erect or procumbent, and usually from one to five feet high. Its leaves are very narrow, half an inch or less in length, concave above, terminating in a very sharp point, and arranged three in a whorl. The male and female flowers grow on separate shrubs, and are clustered in minute catkins, about a twelfth of an inch long, sessile in the axils of the leaves. The fruit is a bluish-black, berrylike cone, about a third of an inch in diameter. The Juniper flowers during May and June.

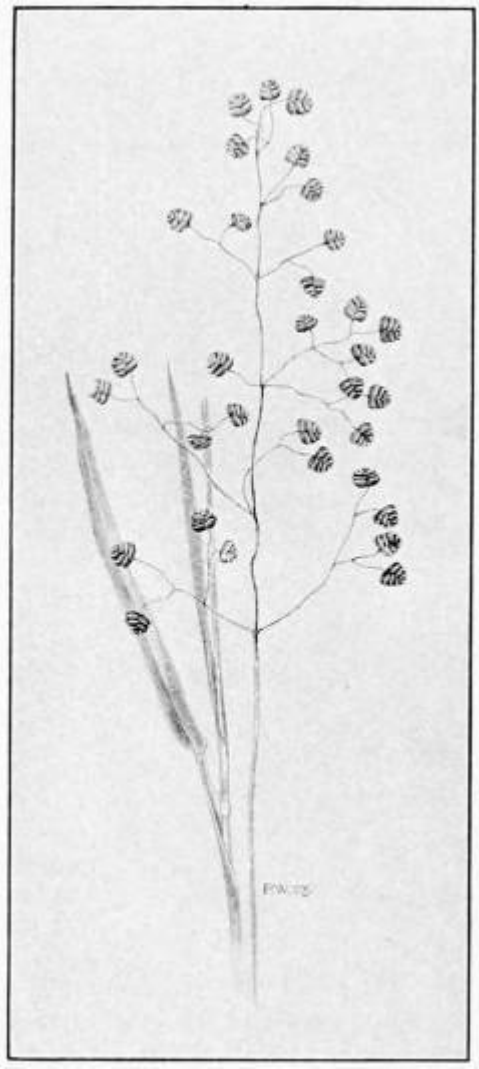


THE BUTCHER'S BROOM, IN FRUIT.

Passing now to the *Orchidaceæ* we have to note two species, the first of which is the Autumnal Lady's Tresses (*Spiranthes autumnalis*), a moderately common plant on the dry downs of South Britain, flowering from August to October. It has two or three thick, oval tubers; and a slender stem, from four to eight inches high, with sheathing, acute scales. The radical leaves, four or five in number, are about an inch long, ovate, sharp, and form a tuft by the side of the stem. The flowers are small, white, scented, and

form a single, spiral line on the stem; but while each flower is turned to one side, its bract is erect on the other side of the stem. The sepals and petals are much alike. The upper sepals are joined to the petals, and the lateral ones curve over the base of the lip of the corolla.

The other plant of this order is the very common Spotted Palmate Orchis (*Orchis maculata*), abundant on the moist heaths and commons of most parts of Britain, flowering from June to August. Its root has two or three flattened tubers with long, finger-like lobes; and the stem is solid, erect, from six inches to more than a foot high. The leaves are ovate below, narrow above, and usually marked with many dark spots. The spike of flowers is dense, oblong or pyramidal in form, and two or three inches long. At the base of each flower is a bract usually shorter than the ovary. The flowers are pale purple, lilac, or (occasionally) white, and are generally conspicuously marked with irregular lines and spots of a deeper tint. The sepals are spreading, about a quarter of an inch long; and the petals are arched over the column. The lip is broad, deeply three-lobed, more or less toothed, either flat or with the lateral lobes slightly turned back. The spur is slender and a little shorter than the ovary. This Orchis is represented on Fig. 6 of Plate VI.



THE COMMON QUAKING GRASS.

Our single example of the *Liliaceæ* is the Butcher's Broom (*Ruscus aculeatus*), the only British monocotyledonous shrub. It is of a very dark green colour, varies from one to four feet in height, and is

occasionally met with on the wooded heaths of the southern counties. Its rigid, evergreen, leaflike appendages, which are ovate in form, terminating in a sharp spine, are not really leaves, but leaflike branches or *cladodes*; for, it will be observed, they bear the flowers and fruits, which are attached to their centres. The only leaves possessed by the plant are the minute, deciduous scales, from the axils of which the cladodes grow. The flowers are white, very small, with a deeply six-cleft, persistent perianth, each one attached to the centre of a cladode by a very minute stalk. They are always on the upper side of the cladode, though it generally happens that they are turned downwards by a twisting of the base of the leaflike branch. The flowers are always imperfect, the male and female blossoms growing on separate shrubs, and both have a small bract at the base. The ovary of the latter develops into a rather large, scarlet, berry-like fruit containing one or two seeds. The flowers appear during March and April.



THE COMMON MAT GRASS.

Two of the Rushes (order *Juncaceæ*) are very common on heaths and moors. One of these is the Heath Rush (*Juncus squarrosus*), which appears on Plate VI. This is a rigid Rush, varying from four to ten inches high, flowering in June and July. Its stems

are stout, solid, and generally leafless; and the leaves are narrow, grooved, usually less than half the length of the stem. The flowers are brown, either distinct or in clusters of two or three, arranged in a compound raceme, with a perianth of shining segments membranous at the margins, and about a sixth of an inch long. The capsules are blunt, but terminate in a pointed bristle.

The other is the Field Woodrush (*Luzula campestris*), a small plant, usually from four to six inches high, flowering from March to June, and often very abundant among the grass of hilly pastures and heaths. Its leaves are fringed with long, soft, white hairs; and the flowers, which are of a very dark brown colour, are arranged in three or four round or oval spikes. The segments of the perianth are very sharp, about an eighth of an inch long, with membranous margins; and the capsules are blunt.

We conclude this chapter with a brief notice of two of the Grasses of heaths and downs. One of these is the Common Quaking Grass or Totter Grass (*Briza media*).—A very pretty, erect grass, rather rigid, from six to eighteen inches high, common on dry downs except in the extreme North of Britain, flowering during June and July. Its stems are tufted, or sometimes slightly creeping; and its leaves are narrow and flat. The spikelets are round or broadly ovate, nearly a quarter of an inch long, more or less tinged with purple, on the long, slender branches of a loose, spreading panicle three or four inches long. The broad glumes are all similar in shape, but decrease in size upwards, and are not bristled.

The other is the Common Mat Grass (*Nardus stricta*), a densely tufted, wiry grass, from four inches to a foot in height, common on heaths and moors,

flowering in June and July. The leaves are very fine and stiff, quite bristle-like. The flowers are in a one-sided spike, from one to three inches long, the one-flowered spikelets being placed alternately in two rows, in the notches of the central axis. The spikelets are often of a reddish or purplish colour, and each has a single, narrow, pointed glume, about a third of an inch long, an inner glume with a short bristle, three stamens, and a single style.


1.
2.
4.



Plate VII.

FLOWERS OF TH

1. Long Smooth-headed Poppy.
2. Field Scabious.
3. Corn Cockle.
4. Corn Marigold.
5. Flax.
6. Corn Pheasant's-eye.

XVII

IN THE CORN FIELD

The flowers included in the present chapter are to be found principally in cultivated fields; but since they are more particularly associated with corn crops, or occur so commonly in those fields in which grain is one of the products included in the rotation adopted,

we separate them from the other flowers of the field, and consider them under the above head.

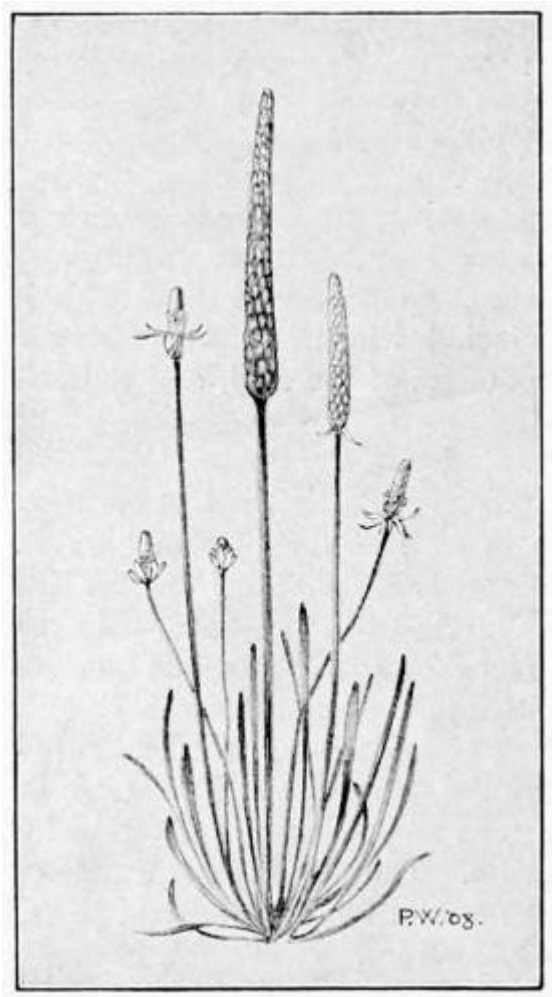
It will be observed that the majority of the flowers thus dealt with are summer-bloomers that flower while the ears of corn are filling out, and consequently are in fruit at the time of harvest. Hence, when the corn is cut, their seeds are shaken from the ripe fruits, or the fruits are themselves levelled to the ground, with the result that those which are not ploughed too deeply into the soil spring up almost in the same position in the following season.

Starting with the species of the Buttercup family (order *Ranunculaceæ*), we take first the beautiful Pheasant's Eye (*Adonis autumnalis*), which is sometimes seen among the corn, especially in the fields of the southern counties. The plant is not a native, but has become well established as a wild flower in several parts, though it is common in only a few localities. It is erect, from six to twelve inches high, and flowers in summer and autumn. The coloured illustration on Plate VII, Fig. 6, renders a written description unnecessary.

The little Mouse-tail (*Myosurus minimus*) of the same order is a very different kind of plant. It seldom exceeds a height of five or six inches, and is commonly only two inches high. Its leaves are all radical, very narrow, fleshy, and measure only from one to three inches, including the stalk; and the little yellowish-green flowers, which bloom from April to June, are solitary on radical stalks. Each flower has five spreading sepals which are prolonged downward at the base into a short spur; five very narrow, tubular petals; a few stamens; and a spike-like cluster of many carpels in the centre. As the fruit ripens the

cluster of carpels lengthens into a slender spike from an inch to an inch and a half long. This species is rather common in the South and South-East of England, and is to be seen most frequently in moist fields.

The Corn Crowfoot (*R. arvensis*) is a slightly hairy plant, with a branched stem from six to eighteen inches in height. The whole is of a pale green colour, and the leaves are deeply cut into narrow, lobed segments. The flowers are pale yellow, about half an inch in diameter, with spreading sepals; and are usually placed opposite the leaves. Their carpels are few in number, comparatively large, flattened, and covered with hooked spines. This is an abundant species, especially in the southern counties, and is most common in weedy fields in which corn-crops have been previously raised. It flowers from May to July.



THE MOUSE-TAIL.

The same order (*Ranunculaceæ*) includes the Field Larkspur (*Delphinium Ajacis*) which sometimes grows wild in corn-fields. It is not indigenous, but has been introduced from South Europe; and the wild plants are probably escapes from cultivation. The stem is from nine to eighteen inches high, with a few

spreading branches; and the leaves are all deeply cut into very narrow segments. The flowers are blue, pink or white, and are arranged in a long, terminal raceme. The five sepals are coloured, the posterior one prolonged into a narrow, hollow spur about half an inch long. There are only two petals, and these are united into a narrow spur which lies within that of the calyx. The fruit consists of a single, downy follicle that contains several seeds. This plant flowers during June and July.

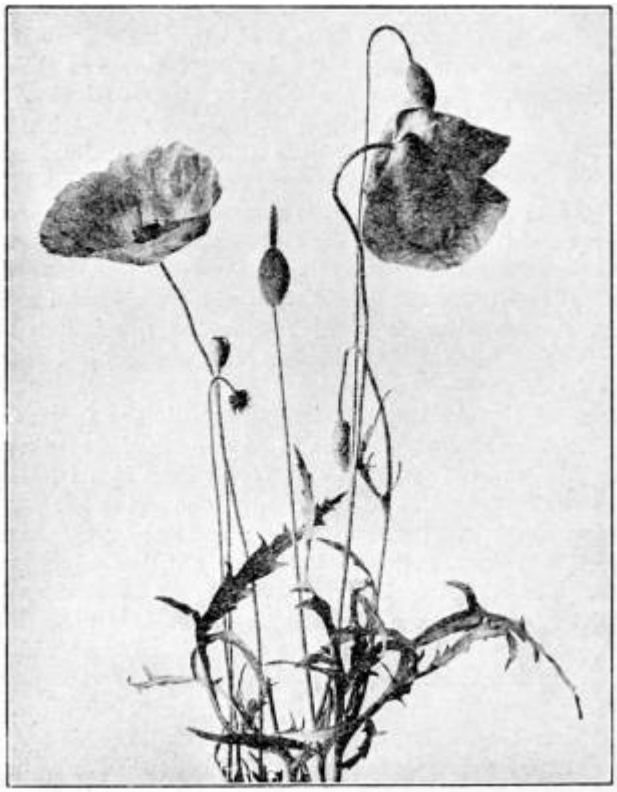
We have now to notice a few of the favourite Poppies (order *Papaveraceæ*); and although these are generally easily distinguished, even by the tyro, from the flowers of other orders, we think it advisable to call attention to the leading features of the group. These plants have a milky sap, and leaves without stipules. Their flowers are large, regular, on long stalks, and droop when in the bud. There are only two sepals, and they generally drop very early. The petals, four in number, are very thin and delicate, crumpled in the bud; and the stamens are numerous. The ovary is peculiar, consisting of one cell that is partially divided by a number of membranes (*placentas*) which pass from the wall towards the centre. It is surmounted by a disc on which are several radiating stigmas, corresponding in number with the membranes within. The fruit opens when ripe by the formation of pores just under the edge of the disc.

The most abundant species is undoubtedly the Common Red Poppy (*Papaver Rhœas*), which is to be found in almost every corn-field, as well as in other fields and waste places in cultivated districts, flowering from May to July. It is from one to two feet high, covered with rather stiff spreading hairs;

and its leaves are pinnately divided into narrow, pointed lobes which are themselves more or less cut. The beautiful, rich scarlet flowers are about three inches in diameter, often with a black patch at the base of each petal, and are solitary on long peduncles that are covered with hairs. The fruit is almost globular, tapering towards the bottom; and on its disc are from eight to twelve radiating stigmas.

The Long-headed Poppy (*P. dubium*) is a very similar plant, but is generally rather more slender, with hairs that do not spread so much; and its leaves are often more deeply cut into narrower lobes. Its flowers are a little smaller, with two opposite petals larger than the other two; and the hairs of the peduncles lie close against the surface. The fruit is oblong, tapering towards the bottom, the length being nearly three times the greatest width. This poppy also flowers from May to July. It is represented in Fig. 1. of Plate VII.

A third species—the Long Prickly-headed Poppy (*P. Argemone*), also known as the Pale Poppy, is a small, weak plant, seldom exceeding nine inches in height, with leaves divided into a few narrow segments. The flowers are of a pale red colour, usually less than two inches in diameter; and, like those of the commonest species, have usually a dark patch at the base of each petal. The fruit is narrow-oblong, tapering below, in fact, almost club-shaped, and is clothed with a few stiff, bristly hairs. The time of flowering is the same as that of the preceding species.



THE COMMON RED POPPY.

In the corn-fields of several parts of England we may meet with the White or Opium Poppy (*P. somniferum*) which is largely grown in warmer countries for the opium it produces, and which was probably introduced into Britain from the Mediterranean region. It is generally about two feet in height, and quite smooth with the exception of a few spreading, stiff hairs on the flower stalks. The whole plant is of a glaucous green colour. The flowers are large, generally of a bluish white colour, often with a purple patch at the base of each petal; and the fruit is large, globular and smooth. This species flowers

from June to August.



THE WHITE OR OPIUM POPPY.

The pretty little Fumitory (*Fumaria officinalis*—order *Fumariaceæ*) is abundant in most of the cornfields and other cultivated places of most parts of Britain, flowering from June to September. It is a very variable plant, quite smooth, and of a delicate, pale green colour. Its stem varies from six inches to over two feet in length, sometimes erect, with spreading branches, but often climbing among the neighbouring vegetation, supported by the twisted

leafstalks. The leaves are pinnately divided into stalked leaflets which are further cut into three-lobed segments; and the flowers are in racemes that are either terminal or opposite the leaves. At first the racemes are short, but they lengthen out considerably as upper flowers open and the lower ones fruit. Each flower has a short pedicel that arises from the axil of a whitish or coloured bract; and the two small sepals are either white or coloured like the bracts. The corolla is oblong, tubular, formed of four petals in two pairs, with a short, blunt spur at the base; and its colour is very variable—usually cream-coloured or pink, and often tipped with crimson.

Some of the Mustards are very common weeds in corn-fields. They belong to the genus *Brassica*, of the order *Cruciferæ*, and are distinguished by their long siliquas, almost cylindrical in form, terminating in a 'beak' which is formed entirely of the persistent style, or of this together with a modified portion of the fruit containing one or more seeds.

One of the commonest of these is the Wild Mustard or Charlock (*Brassica arvensis* or *B. Sinapis*), a very abundant weed in most cultivated fields, probably introduced originally from South Europe. It is a very coarse plant, with scattered, bristly, spreading hairs, growing from one to two feet high, and bearing racemes of yellow flowers that generally exceed a diameter of half an inch. The leaves are ovate, with short, stiff hairs; all are pinnately lobed, and the lower ones have generally a large oval lobe, with coarsely-toothed segments, and a few narrower segments along the stalk. The fruits are spreading, many-angled pods, usually about an inch in length, constricted between the seeds when ripe, with a beak about a third the length of the whole pod enclosing a

single seed at its base. The plant flowers from May to August.

The White Mustard (*Brassica alba* or *Sinapis alba*) is not so common; but it is somewhat largely cultivated for its seedlings, which are used, with those of cress, as salad; and the plant is not unfrequently found as a weed in corn-fields and on other cultivated ground. The whole plant is clothed with rather stiff hairs that are directed downwards, and its height varies from one to two feet. Its leaves are pinnately divided into ovate, coarsely-toothed segments, the terminal one largest. The flowers are bright yellow, about half an inch in diameter, in racemes. The pods are usually near an inch long, on spreading stalks; with a stout, flattened beak, longer than the pod itself, containing a single seed. They are constricted between the seeds, and both valves and beak are clothed with stiff, whitish hairs. The plant flowers during June and July.



THE FUMITORY.

A third member of the same genus—the Black Mustard (*Brassica nigra* or *Sinapis nigra*)—is also cultivated for its seeds, which are used in the preparation of table mustard, and it is also a moderately common weed of cultivation in many parts. It is a hairy plant, from one to three feet high. Its lower leaves are rough, and deeply divided into a large terminal and small lateral lobes; and the upper ones are small, very narrow, smooth and undivided. The flowers are yellow, usually less than half an inch across, in long, narrow racemes; and the shortly-stalked pods are four-angled, smooth, and about half an inch long. They do not spread much, and the short beak consists only of the narrow style. This species flowers from June to August.



THE BLACK MUSTARD.

The Wild Radish or White Charlock (*Raphanus Raphanistrum*) is a common corn-field weed, somewhat resembling the mustards just described in general appearance, but its pods are distinctly constricted between the seeds, and often split when

ripe into from three to seven one-seeded joints. The plant is bristly, and grows from one to two feet high, flowering from May to September. The petals are either white with purplish veins, or pale yellow, or lilac; and the pods, over an inch long, are tipped by the conical style, which is about twice as long as the last joint.

Coming now to the order *Caryophyllaceæ* we have to note the pretty Corn Cockle (*Lychnis Githago*), which is commonly seen in the midst of the corn, often growing so tall that its pale purple flowers peep above the ears. Its stem is clothed with long, soft, white hairs; and the leaves are all long, narrow and entire. The flowers, which appear during July and August, are usually over an inch in diameter, and are solitary on long, leafless peduncles. This flower appears on Plate VII.



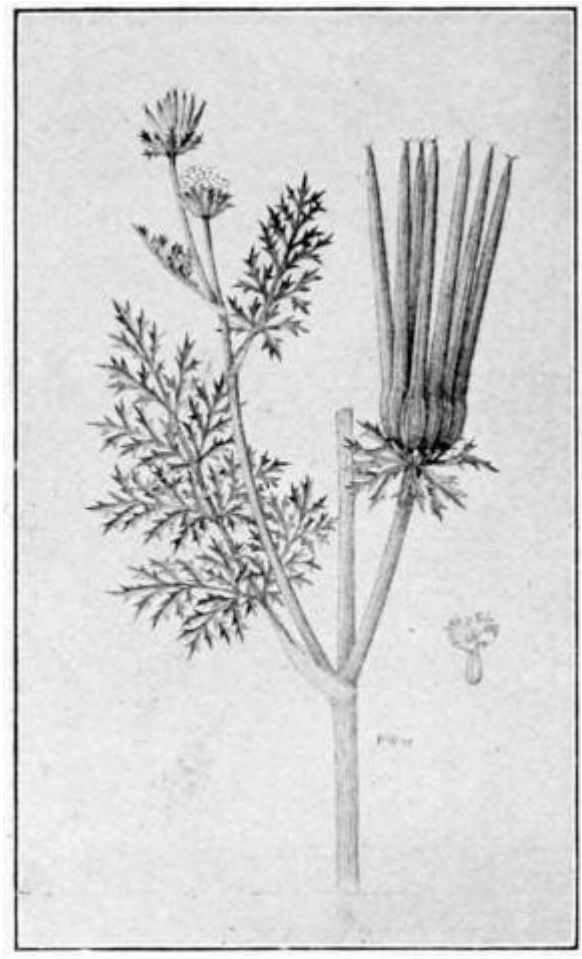
THE CORN SPURREY.

The same order includes the Corn Spurrey (*Spergula arvensis*), a low, procumbent plant, with small, white flowers that bloom from June to August. Its slender stem varies from six to eighteen inches long, and the narrow, whorled leaves from one to two inches. The flowers are only a quarter of an inch in diameter, with sepals usually a little shorter than the petals.

In the order *Linaceæ* we have the Common Flax or Linseed (*Linum usitatissimum*), which is cultivated in some districts, and often appears as a weed in fields.

It is an erect, smooth plant, with a slender stem about a foot high, and very narrow, entire, acute leaves, about an inch long. The flowers are in a loose, terminal corymb, and have five acute sepals; five bright blue petals over half an inch long, which fall early; five perfect and five imperfect stamens; and an ovary with five styles. It flowers during July. (See Plate VII.)

The Shepherd's Needle or Venus's Comb (*Scandix Pecten-Veneris*) of the order *Umbelliferæ* derives its name from the long, flat, needle-like beaks of the fruits that are placed almost parallel like the teeth of a coarse comb. The plant is erect, branched, from three to twelve inches high; and the general character of its leaves and inflorescence may be gathered from our illustration. The flowers are small, white, with larger outer petals; and the carpels of the fruit are cylindrical, about a third of an inch long, with beaks about an inch and a half. The plant flowers from June to September.



THE SHEPHERD'S NEEDLE OR VENUS'S COMB.

Of the order *Rubiaceæ* we shall include the common Field Madder (*Sherardia arvensis*), a little plant, varying from five to ten inches high, the minute lilac flowers of which may be seen from April to October. Its branched stems are often decumbent; and the little, narrow, sharply-pointed leaves, rough on the edges, are placed in whorls of from four to six. The

umbels are very small, terminal, and surrounded by a leafy involucre that is divided into several lobes longer than the flowers. The corolla consists of an exceedingly slender tube, at the top of which are four spreading lobes; and the fruit is crowned by the five or six teeth of the calyx, which enlarges as the former ripens.

The Field Knautia or Field Scabious (*Knautia arvensis* or *Scabiosa arvensis*), shown on Plate VII, is very common on cultivated ground, particularly in corn-growing districts. It is a slightly-branched plant, from one to four feet high, clothed with stiff, bristly hairs. Its lower leaves are stalked, simple, narrow, and usually but little cut; and the upper ones sessile, broader at the base, and either coarsely toothed or deeply cut. The flower-heads are large, lilac, on long peduncles. The outer florets are much larger than the inner, and all have four-lobed corollas. The fruit is angular, and is surmounted by the eight or ten bristles of the calyx. This plant flowers from June to August.



THE VENUS'S LOOKING-GLASS OR CORN BELLFLOWER.

Two of the Sow Thistles (order *Compositæ*) have already been noticed among the flowers of waste places (p. 179), and a third, known as the Corn Sow-Thistle (*Sonchus arvensis*), falls within the range of the present chapter, being a very common corn-field

weed. It is an erect plant, from one to four feet high, with a hollow, angular stem, branched only towards the top. Its lower leaves are large, stalked, more or less divided into triangular, sharply-toothed lobes that are curved downwards; and the upper ones are sessile, less divided, with broad lobes which clasp the stem. The flower-heads are bright yellow, large, and arranged in a loose, terminal corymb. Their stalks and bracts are rough with stiff brown or black hairs; and the pappus of the wrinkled fruits consists of a dense mass of white, silky hairs. The plant blooms during August and September.

The Bluebottle or Cornflower (*Centaurea Cyanus*) is a pretty cornfield Composite, not uncommon in many parts, blooming from June to August. The plant, represented on Plate IV, is covered with loose, cottony hairs, and grows from one to two feet high. The heads of flowers are about an inch in diameter, solitary on long, terminal stalks, surrounded by an oval involucre of closely-overlapping bracts with sharp points and toothed, membranous margins. The receptacle is flat, with silvery bristles between the florets. All the florets are tubular; the central ones of a bluish-purple colour, with purple anthers; and the outer ones much larger, curved, irregular, and bright blue. The fruit is surmounted by a pappus of short, simple hairs.

One of the most beautiful of the corn-field flowers is the Corn Marigold or Yellow Ox-eye Daisy (*Chrysanthemum segetum*), easily distinguished by its rather large flower-heads, solitary on terminal peduncles, with bright golden-yellow ray and disc. It grows from twelve to eighteen inches high, and flowers from May to July. It may be identified by the aid of the coloured illustration on Plate VII.



THE SCARLET PIMPERNEL

The Corn Chamomile (*Anthemis arvensis*), of the same order, is not unfrequently seen in corn fields, flowering from June to August. It is much like the Scentless Mayweed (p. 188) and the Common Chamomile (p. 268) in general appearance, but may be easily distinguished with a little care. It is a rather coarse plant, more or less clothed with a silky down; and its freely-branched stem is usually erect, and from one to two feet high. The leaves are pinnate, with leaflets divided into very narrow, almost hairlike segments; and the flower-heads are rather large, with white ray and yellow disc, solitary on the tops of leafy stalks. The involucre bracts are acute; the receptacle conical; and ray florets always possess a style.



THE CLIMBING BISTORT.

The Stinking Chamomile or Stinking Mayweed (*Anthemis Cotula*) is another similar corn-field plant, but it may be readily recognised by the minute glands dotted over its surface, the acrid secretion of which emits a fœtid odour when rubbed, and often blisters the hand. The plant is generally smooth, with

an erect, branched stem, from nine to fifteen inches high; and pinnate leaves with leaflets divided into short, narrow, pointed lobes. The flowers are similar to those of the previous species, on the tops of long, leafy stalks; but the receptacle, at first convex, lengthens to a tall cone; and the white ray-florets have no style. The involucre bracts are also very narrow, bristly at the top; and the fruits are rendered rough by numerous little glandular projections. This plant flowers from June to September.

The Corn Bellflower or Wild Venus's Looking-glass (*Campanula hybrida*), of the order *Campanulaceæ*, is not uncommon in the cornfields of the chalky districts of South and East England. It is an erect plant, from six to ten inches high, bearing purple, blue, or (occasionally) white flowers from July to September. In addition to the general features shown in our illustration we may note that its long, inferior ovary is three-angled; and that the fruit splits, when ripe, by the formation of slits near the top.

In the order *Boraginaceæ* we have the Small Bugloss (*Lycopsis arvensis*), a branched plant, from six inches to two feet in height, covered all over with stiff bristles that are swollen at the base. Its leaves are oblong or very narrow, wavy, and sometimes toothed; the upper ones sessile and often clasping the stem; and the lower frequently shortly stalked. The flowers are small, pale blue, in simple or branched, one-sided spikes. They have a deeply-cleft calyx of five segments; and the species may be distinguished from other, somewhat similar plants of the same order by the form of the tube of the corolla, which is always bent in the middle. This plant is very common in the corn fields of most parts; and flowers during June and July.



THE DWARF SPURGE.

Our next flower is the pretty little Scarlet Pimpernel or Poor Man's Weather Glass (*Anagallis arvensis*) of the Primrose order (*Primulaceæ*), which is very common in cornfields and on other cultivated ground, flowering from May to very late in the autumn. The stem of this plant is procumbent and much branched, the branches sometimes reaching a length of considerably more than a foot; and its

leaves are opposite, sessile, broadly ovate, undivided, and dotted beneath. The little flowers are solitary in the axils of the leaves, on long, slender peduncles that are always curved backwards as the fruits ripen. The calyx is deeply cleft into five pointed segments; and the bright scarlet (occasionally pink or white) corolla, fringed with minute hairs, spreads its five lobes only in sunny weather. The fruit is a little globular capsule, enclosed in the persistent calyx, splitting transversely into two hemispheres when ripe.

The Climbing Bistort (*Polygonum convolvulus*—order *Polygonaceæ*), also known as the Climbing Buckwheat, Climbing Persicaria, and Black Bindweed, is a very troublesome corn-field weed, with the climbing habit of the Convolvulus, often strangling the plants round which it twines its angular stem. It varies from one to four feet in height; and its alternate leaves are heart-shaped or arrow-shaped, pointed, with short membranous stipules at the base of the stalk. The flowers are small, pale green, in little loose clusters of from four to twelve. The lower clusters are stalked in the axils of the leaves, and the upper ones form irregular, terminal racemes. The five segments of the calyx are bluntly keeled, and occasionally winged; and the three outer ones closely envelop the fruit—a triangular nut. The plant flowers from July to September.

At least two or three of the Spurges (*Euphorbiaceæ*) are commonly seen in cultivated fields, but one in particular—the Dwarf Spurge (*Euphorbia exigua*)—is common in corn fields. It is a slender, smooth plant, usually from two to ten inches high, with several ascending stems diverging from near the base. The

little yellow flowers are in terminal umbels of from three to five rays, sometimes very much contracted; and their glands (see p. 207) are crescent-shaped, with their fine points turned outwards. The time of flowering is July to October.

Our last example of the corn-field plants is the Wild Oat Grass or Havers (*Avena fatua*)—an erect grass, two or three feet high, with rough leaves, and stem hairy at the joints. Its flowers form a loose, spreading panicle, from six to nine inches long; with three-flowered spikelets, about an inch long, on very slender stalks, erect at first but afterwards drooping. The outer glumes are about three quarters of an inch long, tapering to a bristly point, often tinged with purple; and the inner ones, two or three in number, are a little shorter, cleft at the top into pointed lobes, and covered outside with yellowish-brown hairs. The awn is about twice as long as the spikelet, twisted at the base, and usually bent near the middle. This grass flowers during June and July.

XVIII

ON THE CHALK

While some flowers are so universally distributed that they may be described as existing almost everywhere, others are restricted to certain kinds of

localities, outside which they seldom occur. This restriction is sometimes merely one of light and shade, the same species growing almost equally luxuriantly in open spaces, or, in shady places, regardless of other conditions. Some plants, however, are particularly partial to certain conditions of soil, situation, or climate, and are consequently more strictly confined to limited districts.

We have already referred to several species which are essentially flowers of the woods, but even these are not distributed evenly in wooded districts; for while some seem to be more universally scattered throughout our wooded parts, others show a decided partiality to particular soils, being found exclusively, or almost so, either in sandy woods, clayey woods, or woods in limestone districts, &c. In fact, the nature of the soil is such an important factor in determining plant distribution that we naturally associate many species with the particular rock strata on which we almost invariably find them.

So intimately is the distribution of plants connected with that of the geological strata that when, in the course of a day's ramble, we find a more or less sudden change in the nature of the flora, we may be almost sure that there is a corresponding change in the nature of the rocks or soil over which we have strayed; and the young botanist will find much to interest him in the study of this relation between vegetable life and geological structure. Of course we do not mean that the botanist must necessarily be also a geologist, but that he should, at least, be always ready to observe the nature of the habitats of the flowers he finds, noting particularly the kind of soil on which they grow.


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Plate VIII.

FLOWERS OF (

1. Red Valerian.
2. Narrow-leaved Flax.
3. Tufted Horse-shoe Vetch.
4. Spiked Speedwell.
5. Pasque Flower.
6. Bee Orchis.
7. Yellow Oat Grass.

Chalky districts are notably attractive to the lover of flowers; for, not only do they yield a number of species that are almost essentially the offspring of calcareous soils, but also produce other blossoms, often in rich profusion, that are less restricted in their habitats.



THE ROCK ROSE.

In the present chapter we shall note the principal flowers that grow principally or entirely in calcareous districts, the first being the Pasque Flower (*Anemone Pulsatilla*—order *Ranunculaceæ*), rare, it is true, but too beautiful to be omitted from our selection. This flower, shown on Plate VIII, Fig. 5, may be seen on some chalky hills during May and June. It is of a silky nature, and the lovely purple blossoms often reach a diameter of an inch and a half. The leaves are doubly or trebly pinnate, with very narrow segments which increase in length after the flowers have faded. The bracts, which are some distance below the flower, have also linear segments;

and the flowers droop while still in the bud, but the peduncle becomes erect as they expand. The stamens are yellow, and the fruits are provided with feathered hairs.

On chalky, sandy, and other dry soils we may meet with the Round Prickly-headed Poppy (*Papaver hybridum*—order *Papaveraceæ*), very much like the Common Poppy in general appearance, but readily distinguished by its general hairy character, and, more especially, by the globular, furrowed fruit covered with spreading bristles. The flowers vary from one to two inches in diameter, and the crimson or deep scarlet petals are often black at the base.

The Bitter Candytuft (*Iberis amara*—order *Cruciferæ*), which is so well known as a border-flower of our gardens, grows freely in some of the chalk districts of the South and East of England. Unlike most of the Crucifers, the flowers are not symmetrical, the two outer petals being much larger than the others. The inflorescence is a raceme, which, like that of the Wallflower, becomes longer as the flowering proceeds; and the colour of the petals is white, lilac or red. The height of this plant varies from six to nine inches, and the flowers bloom during July and August.

The Wild Mignonette (*Reseda lutea*—order *Resedaceæ*) is very common in some chalky districts, generally in fields and other open ground, and may be easily recognised by its close resemblance to the well-known Sweet Mignonette (*R. odorata*), which is so highly valued as a garden flower on account of its pleasant perfume. It is of a shrubby nature, from one to two feet high, with scattered, stipuled leaves, the lower of which are pinnate, while the upper are three-lobed. The flowers are irregular, yellow, and

arranged in short, conical racemes. The six sepals are unequal and linear; and the petals, also six in number, are very unequal, while the posterior one is divided into many parts. The flowers bloom throughout the summer.

One of the most characteristic flowers of the chalk is the pretty Rock Rose (*Helianthemum vulgare*—order *Cistaceæ*), which is often so abundant that it completely covers large patches of banks and pasture-land. The plant is of a procumbent nature, with woody stems, and opposite, flat, oval or oblong leaves, green above and hoary beneath. The yellow flowers are from three-quarters to an inch in diameter, and are arranged in racemes. There are five sepals, two of which are very small; and the numerous stamens are sensitive, spreading out and lying on the petals when the flower is squeezed. The time of flowering is from June to September.

An allied species—the Hoary Rock Rose (*H. canum* or *H. marifolium*)—may be found in the limestone districts of the West of England, flowering from May to July. The plant is very similar to the last, but the leaves are not stipuled, are smooth or hairy above, and very hoary beneath. The flowers, too, are much smaller.

A species of Violet—the Hairy Violet (*Viola hirta*—order *Violaceæ*)—may be found in some limestone and chalk districts, and also on some dry soils removed from calcareous rocks. It has no runners like those of other species, and its cordate leaves are very hairy, on petioles covered with spreading hairs. The flowers are scentless, pale violet or white, with bracts below the middle of the peduncle; and the spur of the corolla is long, blunt, flattened, and hooked.

Two species of Flax (order *Linaceæ*) are to be found on chalky soils. One—the Perennial Flax (*Linum perenne*)—grows in hilly districts, but is not at all common. It is a slender plant, with numerous wiry stems from one to two feet high; and sessile, linear, acute leaves. The petals are of a beautiful sky-blue colour, but so lightly attached that it is difficult to secure a perfect specimen. The other species—the Narrow-leaved Flax (*L. angustifolium*)—is moderately common on calcareous hills of the South and West of England. It is very similar to the last, and grows to about the same height, but its many stems are more irregularly branched, and the alternate leaves are linear-lanceolate. The corolla is of a lighter lilac-blue colour. *L. perenne* blooms during June and July, and the narrow-leaved species from June to September. The latter is shown on Plate VIII.

Quite a number of species of leguminous plants (order *Leguminosæ*), may, as a rule, be met with on dry soils, but only two common ones may be described as particularly partial to chalk and limestone localities. These are the Tufted Horse-shoe Vetch (*Hippocrepis comosa*) and the Sainfoin or Cock's-head (*Onobrychis sativa*). The former, represented on Plate VIII, is a low, smooth, prostrate plant, six to eighteen inches long, with yellow flowers that bloom from May to August. This plant is sometimes confused with the Bird's-foot Trefoil, which it rather closely resembles in general appearance, but it may be readily distinguished by the pinnate leaves and the peculiar form of the pods. The latter are flattened, and break up, when ripe, into from three to six one-seeded, horse-shoe-shaped segments—a feature which has given rise to the popular name.

The Sainfoin is often cultivated in the South-East of England as fodder for cattle, but may frequently be found growing wild. It is a very pretty, erect plant, from one to two feet high, with dense racemes of rosy-red flowers beautifully striped with a darker tint. The stem is stout and downy, and the pinnate leaves have membranous stipules and numerous oblong leaflets which terminate abruptly in a point. The pod is compressed, semicircular in form, indehiscent, and toothed along the lower edge. This species flowers during June and July.



THE SAINFOIN.

On some chalky heaths the True Sweet-briar (*Rosa rubiginosa*—order *Rosaceæ*) is a common shrub, growing from three to six feet high, and flowering during June and July. It is an erect and compact bush, with numerous prickles of varying shapes—the larger ones being hooked, while the smaller are straight and very unequal. The leaves are compound and stipuled, and the leaflets are rounded at the base, downy, and doubly serrate. The flowers often grow singly, but more commonly from two to four together; they are of a deep rose colour, and the persistent sepals are pinnately divided. The fruit is at first pear-shaped, but afterwards becomes almost globular, and turns red when ripe.



THE SALAD BURNET.

In similar situations we may find the Lesser Burnet or Salad Burnet (*Poterium Sanguisorba*) of the same order. This plant is so different in general appearance from the majority of the Rose family that the amateur would hardly associate it with the others. The flowers are small, and collected together in dense, purple cymes on the top of long, angular stalks. They have no petals, and the four overlapping sepals are usually deciduous. The stamens, five to thirty in number, are pendulous on long, slender

filaments; and the upper flowers display their crimson stigmas before the lower ones produce their stamens. The stem is erect, from six to eighteen inches in height; and the pinnate leaves have many small, sessile, oblong leaflets with coarsely-serrate edges. This plant flowers during June, July, and August.



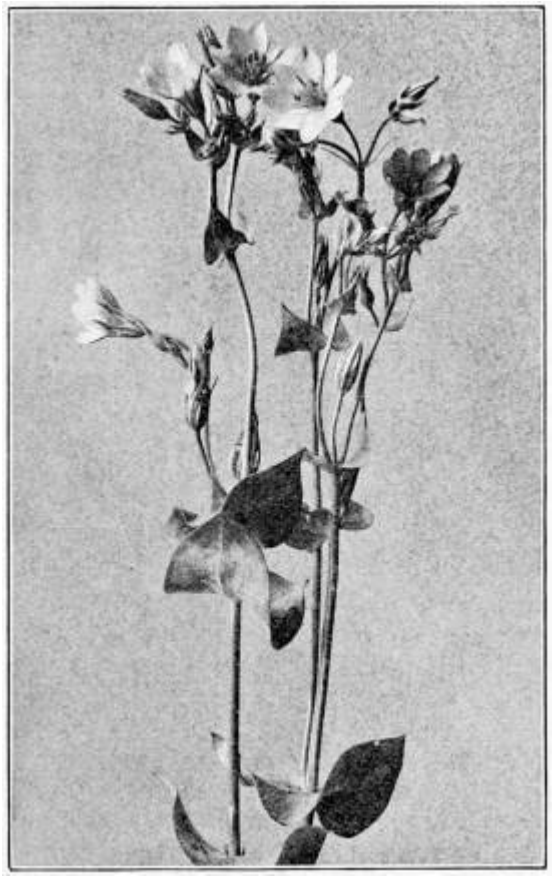
THE FIELD GENTIAN.

The Bedstraw Family (order *Rubiaceæ*) is represented on the chalk by the Rough-fruited Corn Bedstraw (*Galium tricorne*), which is common in fields. It is a

spreading plant, with procumbent stems, one to three feet long; and small, long, narrow leaves, rough with recurved prickles, arranged in whorls of from six to eight. The flowers are small and white, grouped in little cymes of three. The fruit is comparatively large, and granulated, but not bristly, and it droops by the bending of the pedicel. The plant flowers from June to October.

The Red Spur Valerian (*Centranthus ruber*—order *Valerianaceæ*) is a glaucous, leafy plant (see Plate VIII), sometimes growing to a height of two feet or more, often to be seen in chalk-pits and limestone quarries, and frequently on old walls. It is not indigenous, but is cultivated largely as a garden flower, and has now become naturalised. Its corolla, which is sometimes white, has five unequal lobes, a long, flattened tube, and a slender spur. The plant flowers from June to September.

Of the Composite flowers we shall note two species, the first being the Woolly-headed Plume-thistle (*Carduus eriophorus*), common in chalky fields, where it throws up its large, cottony heads to a height of from three to five feet during July and August. In order to distinguish it from other similar thistles we must note that its stem is not winged, and that the deeply-divided leaves, with bifid lobes, half clasp the stem at the base; also that the involucre bracts are lanceolate, with long, reflexed spines. The heads of this thistle are of a pale purple colour, of a globular form, two to three inches in diameter, and covered with a thick, cottony growth.



THE YELLOW-WORT.

Our other example of the Composite flowers is the Ploughman's Spikenard (*Inula Conyza*), which is common on chalky banks and pastures, flowering from July to September. It is an erect, downy plant, from two to five feet high, with oval, lanceolate, downy leaves of a dull green colour. The upper leaves are entire and sessile, while the lower are toothed and stalked. The numerous flower heads are of a dull yellow colour, with leaflike bracts, arranged

in a branched corymb. The involucre bracts are linear and reflexed, and the ray florets are inconspicuous.

Two representatives of the order *Gentianaceæ* are commonly found on chalk hills and pastures; they are the Field Gentian (*Gentiana campestris*), and the Perfoliate Yellow-wort (*Chlora perfoliata*, or *Blackstonia perfoliata*). The former is an erect plant, from four to ten inches high, with a branched stem; opposite, sessile leaves; and conspicuous, bluish-purple flowers, blooming in August and September. The calyx is cleft into four, the two outer segments being large and ovate. The corolla is also four-cleft, and salver-shaped.



THE GREAT MULLEIN.

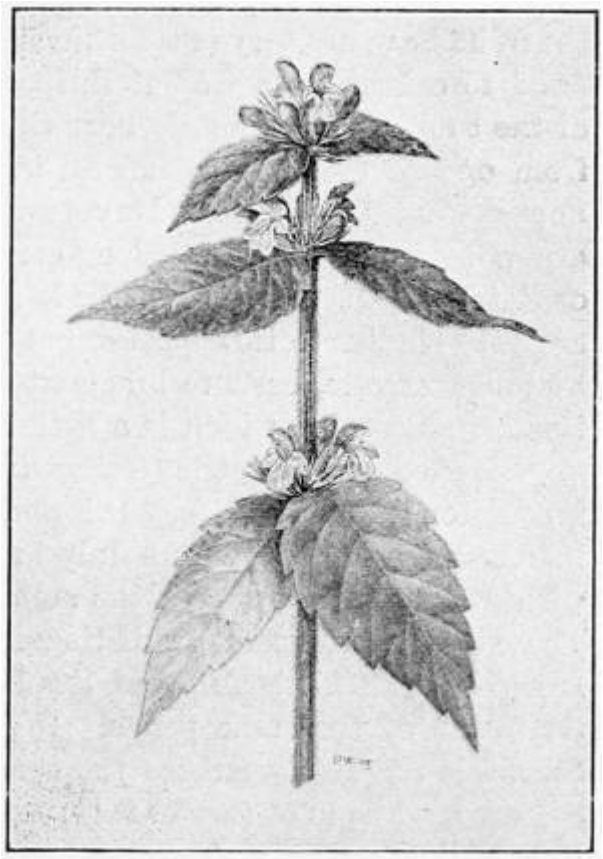
The Yellow-wort is an erect, glaucous plant, with an unbranched stem from six to eighteen inches in height, and beautiful yellow flowers, from four to nine in number, arranged in a cyme. The leaves are in widely-separated pairs, united at their bases, so that the stem penetrates them. The calyx is deeply divided, and the limbs of the corolla are spreading. This plant flowers from June to September.

Some species of Mullein (*Verbascum*) are particularly

partial to chalk and limestone districts. They are handsome plants, belonging to the order *Scrophulariaceæ*, rendered conspicuous by their woolly leaves and spikes of yellow or white flowers. The Great Mullein (*V. Thapsus*) is common on banks and roadsides, and flowers from June to August. Its stem is stout, erect, very woolly, and varies from two to five feet in height. The leaves are very large and thick, and are so woolly on both sides that they resemble flannel. The flowers form a large, dense, club-shaped spike. Each has a corolla with five spreading lobes; and five stamens, with white hairs on their filaments, two longer than the other three. The fruit is a capsule containing many seeds and splitting longitudinally.

The White Mullein (*V. Lychnitis*) is not at all common, but may be found in similar situations. Its stem is angular, seldom more than three feet high, the leaves nearly smooth above, and the flowers white or cream, blooming from June to August.

A third species—the Yellow Hoary Mullein (*V. pulverulentum*)—grows on banks, chiefly in Norfolk and Suffolk, flowering during July and August. It is about three feet in height; the stem is round, with a mealy surface; and the leaves, which are not continued down the stem, are covered both above and below with starlike hairs that give them a mealy appearance. The flowers form a pyramidal panicle, and are of a bright yellow colour, with scarlet stamens covered with white hairs.



THE RED HEMP-NETTLE.

There is yet another species to be found on chalky soils, more especially in hedges and on banks and roadsides. It is the Dark Mullein (*V. nigrum*), so called on account of the darker hue of the stem and leaves. It grows to a height of about three feet and flowers from June to September. It is a beautiful plant, not so strong in build as the Great Mullein, with an angular stem, and oblong heart-shaped leaves, nearly smooth above, and covered with starlike hairs which give it a downy appearance,

especially on the under surface. The leaves are not continued down the stem, and the lower ones have long stalks. The flowers are bright yellow, very numerous, and form a spike-like panicle. The stamens are covered with purple hairs.

The Spiked Speedwell (*Veronica spicata*), of the same order, neither common nor widely distributed, is to be found chiefly in the chalk and limestone districts of the South and West of England, flowering during July and August. It has a long, dense, terminal spike of blue or pink flowers about a quarter of an inch in diameter. The corolla has a long tube, and unequal, narrow lobes; and the flattened capsules split into two valves when ripe. A large variety of this species, known as the Tall Spiked Speedwell, occurs in limestone districts of the West. The normal form is shown in Fig. 4, of Plate VIII.

Of the Labiates perhaps the one most partial to the chalk is the Wild Sage or Clary (*Salvia Verbenaca*); and even this is not confined to calcareous soils, but thrives in dry pastures in many parts of the country, particularly near the sea. It is an aromatic herb, from one to two feet in height, with long spikes of bluish purple flowers that bloom from May to September. The leaves, which are not numerous, are oblong-cordate (the upper ones broadly cordate), blunt, coarsely toothed, and wrinkled. Other Labiates are very similar to this species, but the Clary may be distinguished by its two ovate, cordate bracts at the base of each flower, and by its narrow corolla, which is a little shorter than the calyx.

The Red Hemp-nettle (*Galeopsis Ladanum*), of the same order, is common in chalky fields. It is about a foot in height, and displays its *rose-coloured* flowers from July to October. The plant is covered with very

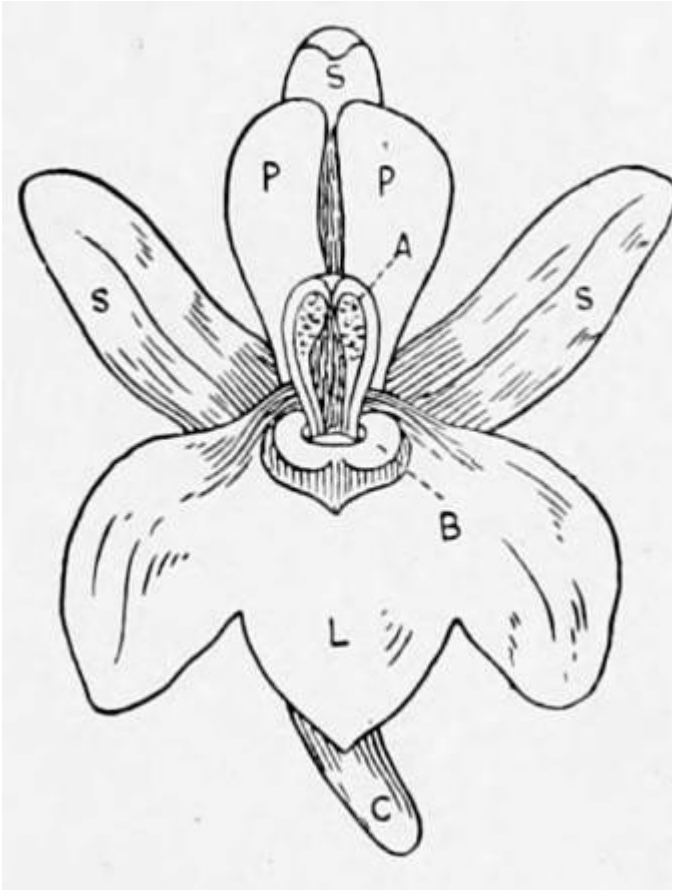
soft hairs, and the stem is not swollen at the joints. These two features serve to distinguish the species from the Common Hemp-nettle (*G. tetrahit*) and the Large-flowered Hemp-nettle (*G. versicolor*) of the same genus. It should also be noted that the corolla is not really red, as the common name suggests, but rose-coloured, while in *G. tetrahit* it is purple or white, and in *G. versicolor* it is yellow. The upper lip of the flower, too, is only slightly notched.

The Viper's Bugloss (*Echium vulgare*—order *Boraginaceæ*) is common on dry soils, especially in calcareous districts, where it is often found close to the sea, even on the beach very near high-water level. It is a very peculiar plant, both stem and leaves being thickly covered with stiff, sharp bristles. The stem is unbranched, from two to three feet high; and the leaves are lanceolate. The flowers are of a bright rose-colour when they first open, and afterwards change to a bright purple-blue; they are arranged in short, lateral, curved, one-sided spikes. Both leaves and flowers droop very rapidly after they have been gathered. This plant flowers from June to August.

Another species of the same genus, known as the Purple Viper's Bugloss (*E. Plantagineum*), is common in the Channel Islands. It may be distinguished by its branched stem and longer spikes of flowers. The lower leaves, too, are oblong and stalked, while the upper ones are cordate and half clasp the stem.

No doubt the reader is already acquainted with the commoner Plantains (order *Plantaginaceæ*), so easily distinguished by their spreading radical leaves, with prominent, parallel ribs, and their dense spikes of greenish flowers. There are five British species, one of which—the Hoary Plantain or Lamb's-tongue (*Plantago media*) is particularly partial to chalky

districts, where it grows in pastures and on dry banks. Its flowering stems grow from three inches to a foot in height, and the flowers bloom from June to September. The leaves are elliptical, either sessile or shortly stalked, and have from five to nine ribs. They lie so closely on the soil that nothing can grow beneath them, and even present the appearance of having been pressed against the ground. They also have a downy surface; and the stalk, where it exists, is flattened. The flowering stem is round, and the spike cylindrical. The calyx is cleft into four, with its segments turned backward; and the sepals are not keeled as they are in some other species. The corolla is tubular, with four spreading limbs; and the cream-coloured anthers are displayed on the tips of long filaments.



AN ORCHIS FLOWER.
S, sepals. P, petals. L, lip. C, spur. A, pollen masses. B, stigma

We have now to consider several representatives of the *Orchidaceæ*, and it will be well here to note the general characters of this remarkable order as a whole. The Orchids have rounded or palmate tuberous roots, a few glossy leaves which sheath the stem, and simple spikes or racemes of flowers, the prevailing colours of which are red, pink, green and white. The sepals, three in number, often partake

more of the nature of petals. There are three petals, the lowest one, forming the lower lip of the flower, often prolonged into a spur, and frequently assuming a remarkable form resembling an insect or some other member of the animal creation. The stamens are united to the style, and form with it a solid *column*, but usually only one produces pollen, and this one commonly consists of one or two club-shaped masses. The ovary is inferior, often twisted so as to invert the flower, and sometimes so long as to be mistaken for a flower stalk. The stigma is hollow, sticky, and situated just in front of the column above mentioned. The fruit is a three-valved capsule, containing many seeds.

Orchids are generally scented flowers, and produce nectar which is stored either in the cavity of the spur, or within the tissue of the same. In the latter case it cannot be obtained by insects unless they bore into the substance of the spur, and the delay caused renders the removal of the pollen more certain. While the nectar is being withdrawn, the head of the insect is pressed against a sticky disc at the base of the pollen masses, with the result that both disc and pollen masses are bodily removed, and the insect leaves the flower with the whole attached to its head. It often happens, too, that the pollen masses bend forward as the insect flies through the air, and thus they are more likely to be pressed against the stigma when another flower is visited. Here, then, is another wonderful contrivance for the purpose of securing cross-fertilisation, and the whole process may be imitated by thrusting the point of a pencil into the spur of a flower which has not been previously visited by an insect, and then inserting the point into the spur of a second flower. It should be noted, also, that the pollen is not all removed by

contact with the sticky surface of a stigma against which the pollen masses are pressed, and thus the pollen obtained from one flower will often fertilise several others.

Our first species—the Broad-leaved Helleborine (*Epipactis latifolia*), is common in hilly woods, where it flowers during July and August. Its single stem grows from one to three feet high, and the leaves are broadly ovate and ribbed. The flowers are greenish, with reddish-purple lips, and are arranged in a long, loose, one-sided raceme. The sepals are ovate, longer than the acute lower lobe of the lip; and the bracts are generally longer than the flowers. The ovary is downy, and not so long as the bracts. (Plate II, Fig. 5.)

The somewhat similar Large White Helleborine (*Cephalanthera grandiflora*), which bears creamy white flowers in May and June, is also common in some of the woods on calcareous soils.

The Pyramidal Orchis (*O. pyramidalis*) grows in limestone pastures, flowering during July and August. This species varies from six to eighteen inches in height, and has linear, acute leaves. The spike of flowers is very dense, of a pyramidal form, and the individual blooms are small, usually of a rose colour, but occasionally white or nearly so. The sepals are spreading, and the lip of the flower has three equal lobes which are oblong and abruptly cut at the tips. The spur is slender and longer than the ovary.

The Fragrant Gymnadenia or Sweet-scented Orchis (*Habenaria conopsea* or *Gymnadenia conopsea*) is common on chalky heaths and hilly pastures. It grows from twelve to eighteen inches high, has palmate, tuberous roots, and oblong-lanceolate,

acute, keeled leaves. The flowers appear from June to August, and are in a dense, elongated spike. The buds are of a deep rose colour, and the open flowers are very fragrant, of a lighter colour, and not spotted. The bracts have three veins; the lateral sepals are spreading; the spur long and slender, much longer than the ovary; and the lip of the flower has three, equal, undivided lobes.



THE SWEET-SCENTED ORCHIS.

The Green Man Orchis (*Aceras anthropophora*), though rather rare, and confined to the dry, chalky pastures of East England, is too interesting to be omitted from our selection. The plant is from six to twelve inches high, with palmate tubers, and mostly radical leaves. The flowers are sessile, forming a loose spike, and are strange caricatures of the human figure. Each has a comparatively large green hood, a slender yellowish lip with two lateral lobes to represent the arms, and two similar terminal lobes for the legs. The lateral sepals are green, ovate and convergent; and the flower has no spur. The time of flowering is June and July.

The Green Musk Orchis (*Herminium Monorchis*), also rather rare, is to be found in chalky pastures of the South, flowering in June and July. It has oval, stalked tubers; two lanceolate, radical leaves, and generally only one leaf on the slender stem. The spike is loose and slender; and the flowers, which are small and green, are sessile, and emit a musky odour during the night. The sepals are broad ovate; the petals narrower; and the lip is three-lobed, pouch-like at the base, with terminal lobe longer than the other two.

One of the most remarkable, and, at the same time, one of the most beautiful of Orchids is the Bee Orchis (*Ophrys apifera*). Although not to be described as common, it is frequently to be seen in moderate numbers on banks and in open ground in calcareous districts. Its height is from six to twelve inches, and it flowers during June and July. The leaves are short, oblong, and mostly radical; the bracts large and leafy; and the flowers, numbering from two to six, are arranged in a lax spike, and very closely

resemble certain species of bees. The sepals are spreading, oval, and pink inside; and the petals are linear and downy. The lip of the flower is swollen and broad, very velvety, and of a rich brown colour variegated with yellow. It is not longer than the sepals, and has four lobes, the two lower of which are hairy, while the other two are bent under. There is also a sharp, reflexed appendage in the notch. The flower is shown on Plate VIII.

A rare variety, very much like the commoner type just described, is occasionally seen in Kent and Surrey. It is called the Late Spider Orchis (variety *arachnites*), and is supposed to resemble a spider more than a bee. The petals are more triangular than in the Bee Orchis, and the lip is longer than the sepals. It may also be distinguished by the appendage in the notch, which is cordate in form, and flat.

Another rare plant—the Spider Orchis (*Ophrys aranifera*) is to be found in chalky pastures of the South-East. Its flowers are smaller, and generally fewer in number. The sepals are yellowish-green inside, and the petals smooth and linear. The lip is swollen and four-lobed, but without any appendage in the notch, and is of a deep purple-brown, with yellowish markings. This is an earlier species, flowering during April and May.

Our last example of this order is the pretty little Fly Orchis (*Ophrys muscifera*). It is a slender plant, with a few oblong leaves, and usually from two to ten flowers arranged in a loose spike. The sepals are yellowish-green, and the very slender petals resemble the antennæ of an insect. The lip of the flower is of a brownish purple colour, with a blue blotch in the middle; and is oblong, with three lobes, the middle

of which is divided into two. This species grows from six inches to a foot in height, and flowers from May to July. It is moderately common in the open spaces and on the banks of some calcareous districts.

Although a great variety of Grasses (order *Gramineæ*) are to be found on calcareous soils, there are two common species which are almost exclusively confined to dry, chalky pastures. One is the Downy Oat Grass (*Avena pubescens*), which flowers in June and July. It has a creeping stem, and grows from one to two feet high. The radical leaves are short, hairy, with sharply-pointed ligules, and terminate abruptly in a sharp point. The flowers are arranged in a nearly simple panicle, with erect spikelets of five or six flowers. The glumes are nearly equal, the inner one with three ribs. The flowering glume is divided at the tip, and provided with a long, bent, twisted bristle.

The other, numbered 7 on Plate VIII, is the Yellow Oat Grass (*A. flavescens*), which grows to about the same height, and flowers at the same time. In this species the radical leaves are hairy, and also terminate suddenly in a sharp point. The panicle is much branched, with erect spikelets of five or six flowers. In this one, too, the inner glumes have three ribs, but it may be distinguished from the last by the two terminal bristles of the inner scales, and by the blunt ligules (appendages at the base) of the sheathing leaves.

XIX

BY THE RIVER SIDE

We have already dealt with flowers that grow in various damp situations, as moist meadows, woods, &c.; but there are a few such which seem to be particularly partial to the banks of rivers, streams, and ditches: short descriptions of these will be placed separately in the present chapter.

It will be understood from the foregoing remark that the species taken here form only a small proportion of the flowers that actually grow by the river side; for although the numerous species commonly seen in moist fields and meadows may flourish quite to the water's edge, yet there are not many which require the extreme wetness of soil that restricts them to the sodden banks of rivers and streams.

Our first example is the Common Meadow Rue (*Thalictrum flavum*). It belongs to the order *Ranunculaceæ*, but its pale yellow flowers do not, at first sight, suggest a resemblance to the buttercups, anemones, and other favourite flowers of this group, for they have no petals, very small sepals, and are rendered conspicuous only by their densely-clustered stamens, with their long, projecting, bright yellow anthers. The plant is erect, from two to four feet high; and flowers during July and August.

Passing over the Monk's-hood (*Aconitum Napellus*), so well known as a garden flower, which is occasionally seen wild near the banks of streams and ditches, we come to the Blue Meadow Crane's-bill (*Geranium pratense*)—one of the several species of pretty Wild

Geraniums (order *Geraniaceæ*). It is a downy plant, varying from one to four feet high, with an erect stem, swollen at the nodes; and opposite, roundish leaves, deeply divided into five or seven lobes with sharp segments. The flowers are of a bluish purple colour, an inch or more in diameter, usually arranged two on a stalk, the two pedicels spreading while in flower, but turned downwards when in fruit. The five sepals have long points, and the five petals are slightly notched. As in other species of the genus there are ten stamens, five shorter than the other five; and a five-lobed ovary, with an equal number of long styles, all attached to a long, central beak. The five carpels separate when ripe, and are raised by the curling of their styles. This flower is common in wet meadows, especially in the southern counties, and is usually more frequent along the banks of rivers and ditches, but it is sometimes also seen in wet thickets. It flowers in June and July.



THE COMMON MEADOW RUE.

The Hemp Agrimony (*Eupatorium cannabinum*), of the order *Compositæ*, is very common along the banks of streams and on the borders of wayside ditches all over Britain. It would hardly be taken for a composite flower by those who are acquainted only with the more typical members of the order, but an examination of its rather dull lilac blossoms will soon reveal its affinity to the other members of the group,

for the compact, terminal corymb is formed of numerous small heads, each consisting of about five tubular, perfect florets of equal size, surrounded by an involucre of a few overlapping bracts, and remarkable on account of their projecting styles, which are deeply divided into club-shaped branches. The plant is a large one, with erect, reddish stems, varying from two to six feet in height; and it flowers from July to September.



THE HEMP AGRIMONY.

We have already noticed the Lesser Skull-cap (p. 275), which is rather common on damp heaths, and there is another British member of the same genus—the Common Skull-cap (*Scutellaria galericulata*)—that

is frequently seen on the banks of streams and in other wet places. The latter is a slightly downy plant, with a creeping stock, and a slender, branched stem from eight to sixteen inches high. Its leaves are opposite, as in other plants of the same order (*Labiatæ*), with very short stalks, and crenate or slightly-toothed edges. The flowers are in pairs in the axils of the leaves, almost sessile, and all turned towards the same side of the stem. On the back of the two-lipped calyx is a hollow, scale-like projection which gave rise to the popular name, for when the corolla falls, the lips of the calyx close over the ripening fruit, and the projection above mentioned then presents somewhat the appearance of a cap. The corolla is over half an inch long, of a dull blue colour without, but much paler inside. This plant flowers from July to September.

On the banks of streams and ditches we may often meet with the Comfrey (*Symphytum officinale*)—a coarse and rough but pretty plant belonging to the *Boraginaceæ*. It has a stout, branching stem, two or three feet high; and the stem-leaves extend downward on its surface forming wing-like ridges. The lower leaves are stalked, broader than the upper ones, generally from six to eight inches long; and all the leaves are rough with bristly hairs. The flowers are of a yellowish white or, sometimes, of a purple colour, and are arranged in forked, drooping, one-sided racemes. The calyx is deeply cleft into five lobes; and the corolla consists of a tubular portion, the top of which is closed by five narrow, fringed scales; and, above this, a wider bell-shaped part, of about the same length, with five small, reflexed teeth. This plant blooms during May and June.



THE COMMON SKULL-CAP.

The Yellow Loosestrife (*Lysimachia vulgaris*), of the order *Primulaceæ* is a beautiful river-side plant, common in most parts, flowering during July and August. Its stem is stout, erect, branched, slightly downy, from two to three feet high; and its leaves are ovate or lanceolate, sessile, and arranged in opposite pairs or in whorls of three or four. The

flowers are rather large, of a bright yellow colour, dotted with orange, and arranged in a large, pyramidal, leafy panicle. The calyx is deeply cleft into five pointed segments with hairy margins; and the broadly bell-shaped corolla is deeply divided into five wide lobes. All the five stamens are united by their filaments, forming a kind of cup around the ovary.



THE COMFREY.

There is another beautiful Loosestrife—the Purple Loosestrife—that is often seen on river-banks; but as it is not particularly partial to this habitat, but rather grows in marshes and wet places generally, it is described in another chapter (XV). It should be noted, however, that the two plants are not so nearly allied as the popular names suggest; for while the one described above is of the Primrose family, the

latter is a member of the *Lythraceæ*, and differs in having a corolla of free petals.

Passing now to the order *Polygonaceæ* we have to note the Great Water Dock (*Rumex Hydrolapathum*)—a smooth plant, varying from three to six feet in height, much resembling other Common Docks in general appearance, but found almost always on the borders of streams and ponds. Its leaves are lanceolate in form, usually pointed, and either flat or slightly curled at the margins. The upper ones taper down into the stalk; but the lower ones, which are from one to two feet long, are often heart-shaped at the base. The reddish-green flowers are closely-whorled, and form long panicles. The perianth is cleft into six parts, of which the three outer are smaller and covered with little tubercles, while the inner become enlarged and close over the triangular fruit. Each flower has six stamens and three very short styles. This plant is in flower during July and August.

A few species of Willows and Sallows that grow on the banks of streams belong to the order *Salicaceæ*, and have the following features in common:—Their leaves are simple, stipulate, and deciduous. The flowers are imperfect, in erect catkins with small scales at the base, the male and the female flowers being produced on separate trees or shrubs. Each male flower consists only of a small scale and two or more stamens; and the female of a similar scale, and a conical ovary of one cell with a forked style. The fruit is a conical capsule of two valves, containing several seeds that are covered with white, silky hairs. The species referred to are the Almond-leaved and the Bay-leaved Willows, the Dark-leaved Sallow, and the Purple Osier, but we refrain from introducing

descriptions since the identification of these trees is somewhat difficult for a beginner.

XX

ON WALLS, ROCKS, AND STONY PLACES

Several of our flowering plants are to be seen most frequently on walls and rocks, or in other situations where there is hardly a trace of soil of any kind. Some of these thrive in such dry spots, with often such free exposure to the rays of the spring or summer sun, that it is difficult to understand how they manage to survive the periods of drought through which they live until we become acquainted with certain peculiarities of their form and structure.

In the first place we must recall the fact that plants lose a considerable amount of moisture by evaporation from the transpirating surfaces of their leaves, and that this loss must necessarily be greatest when the air is warm and dry unless there is some means by which the transpiration is automatically regulated according to the requirements of the plant and to the varying conditions under which it has to exist.

The leaves of plants are covered with a thin skin or

epidermis which consists of a single layer of cells, and which is practically impermeable to moisture. In this epidermis, however, on one or both sides of the leaf, are minute pores (*stomata*) through which water vapour is free to pass; and beneath the porous epidermis is a loose, cellular tissue, with air-spaces, from which the moisture can readily pass, in the form of vapour, to these stomata.

Each of the stomata is bordered by a pair of crescent-shaped *guard-cells*, placed with their concave sides towards each other, and joined at the ends. Further, the guard-cells are capable of changing their form, becoming straighter, and thus reducing or even closing the aperture between them; and becoming again curved, opening or enlarging the pore. The former change takes place during darkness, thus preserving the plant from the cooling effects of evaporation during the chilly nights; and also during dry weather when the plant is in danger of losing much more moisture than the roots can absorb.

So far, however, we have been dealing with a regulating process that is common to green plants in general; but we must look for some additional protection against loss of moisture in the plants which grow in such places that they have to live through longer or shorter periods during which the roots have little or no moisture within reach.

From what has been said concerning the structure of the leaf it will be understood that, as a rule, the larger the surface the greater will be the loss of water in a given time. But when we examine the leaves of the plants that grow on dry walls and rocks, we frequently find that they are more or less thick and fleshy—that the material of the leaf is disposed in such a manner as to reduce the area of the surface as

compared with other leaves made up of the same amount of tissue.

In some species this diminution of surface is carried to the extreme, and the leaves have become very thick, assuming a cylindrical or almost globular form; and such leaves are capable of absorbing and retaining large supplies of water that serve to maintain the plant during those periods in which the roots have no moisture within their reach.

We also find that many of the plants in question are further protected from a dangerous loss of moisture by the peculiar arrangement of their leaves, which are often so closely applied to the stem, or so closely overlapping one over another, that the total area of exposed surface is considerably reduced; and it frequently happens that the stem of the plant becomes thick and succulent, as well as the leaves, thus adding to the store of moisture kept in reserve for the rainless days.

While some plants are almost invariably found in dry, stony places, others are very diverse in their habitats, sometimes growing in moist and shady places, and sometimes on cliffs or other rocky situations. In the latter we often find considerable modifications of size, form and structure, the same species being more or less luxuriant and thin-leaved when in damp soils, while in rocky places it becomes more or less stunted, with a tendency to produce thick and succulent leaves.

A few of the plants that we include in the present chapter are to be found only on wet rocks, and are therefore of a nature very different from that of the species growing in dry places. They are always well supplied with moisture; and, being usually surrounded by a damp atmosphere, they lose but

little water by evaporation, and thus require no reserves within their leaves or stems.

Our first species is the well-known Wallflower (*Cheiranthus cheiri*), of the order *Cruciferæ*. It is a rather shrubby plant, frequent on old walls and ruins, where it flowers during April and May. Though too familiar to need any description, we may note that in the wild state it varies from six to twelve inches high, and bears sweetly-scented, yellow or orange flowers. The plant is not indigenous, but has now become naturalised as a wild flower in most parts of Britain.

The Wall Rocket (*Diplotaxis tenuifolia* or *Brassica tenuifolia*), of the same order, is a very similar plant, growing in similar situations, but it does not commence to flower till the summer is somewhat advanced. Its stem is leafy, branched, smooth, woody towards the base, but more slender than that of the Wallflower; and its very variable leaves are generally three or four inches long, deeply divided pinnately into narrow segments with irregularly-toothed margins, and emit a rather unpleasant odour when rubbed. The flowers are of a pale yellow colour, fragrant, about three-quarters of an inch in diameter, in terminal racemes, with sepals more or less spreading; and the fruits are narrow, flattened siliquas, with membranous valves, about an inch and a half long. The plant is to be found principally in the southern counties of England, and flowers from July to September or early October.

On dry rocks, chiefly in the hilly and mountainous districts of North and West Britain, we meet with the Vernal Sandwort (*Arenaria verna*) of the order *Caryophyllaceæ*. This is a little tufted plant, only from two to four inches high, with branched stems more

or less decumbent at the base; and small, sessile, opposite, very narrow leaves, each with three veins. The starlike, white flowers are about a third of an inch across, on slender stalks, and grouped in terminal, loose, few-flowered cymes. They have five pointed sepals, less than a quarter of an inch long, each with three prominent veins; five spreading petals, a little longer than the sepals; ten stamens; and a superior ovary with three narrow styles. The fruit is a short ovate capsule which opens, when ripe, by three valves.

One of the Geraniums—the Shining Crane's-bill (*Geranium lucidum*)—is almost essentially a plant of walls and rocks. It is a beautiful species, smooth and shining in all its parts, with a tendency to turn red, like the Herb Robert; and, as in other plants of its order (*Geraniaceæ*), distinguished by the swollen joints of its stem. The leaves are almost round in general outline, but are deeply divided into five, broad, coarsely-toothed segments. The flowers are small, rose-coloured, and generally grow in pairs on axillary stalks. They have five, erect, wrinkled sepals, with long points; and five short, rather broad, entire petals. This species is common in most parts of Britain. It varies in height from six to eighteen inches, and flowers from May to September.

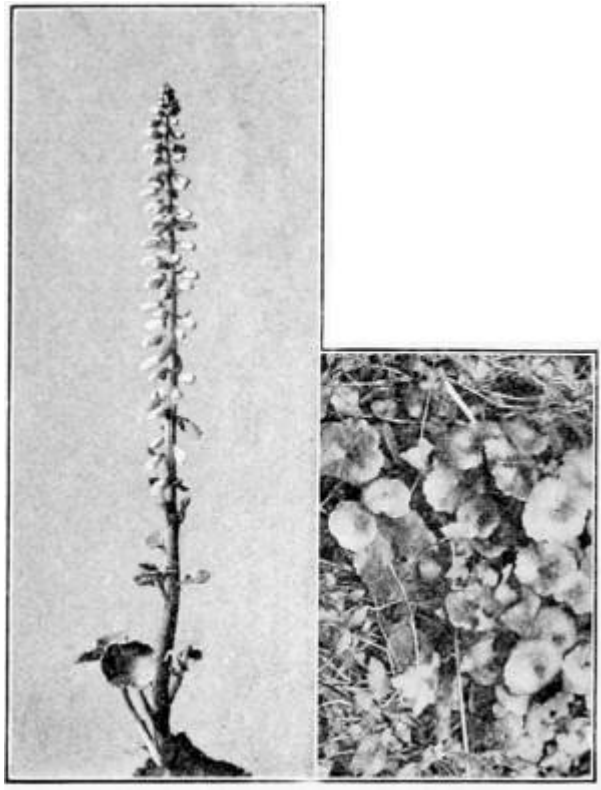


The Biting Stonecrop or Wall Pepper.

We have now to consider a few species of the order *Crassulaceæ*, which includes some very interesting succulent plants that are peculiarly adapted to a life in the dryest of situations on walls, roofs, &c. In addition to the thick, fleshy nature of their stems and leaves, these plants are distinguished by terminal cymes or corymbs of flowers with (usually) five sepals, the same number of distinct petals, twice as many stamens arranged in two whorls, and carpels

equal in number to the petals. Three of the plants referred to are known as Stonecrops, and may be recognised by the following descriptions:—

1. The English Stonecrop (*Sedum anglicum*).—A smooth plant, two or three inches high, abundant in rocky and stony places, especially in the West and near the sea, flowering from June to August. Its stems are more or less decumbent, much branched and rooting at the base; and its leaves are small, thick, almost globular, of a pale green colour with, often, a tinge of red. On the small flowerless branches the leaves are very crowded and overlapping; but on the taller, flowering stems they are more scattered and placed alternately. The little starlike flowers are white, frequently tinged with pink or spotted with red, and arranged in a short, two-forked panicle. They have short, green sepals; narrow, sharply-pointed petals about twice the length; and stamens with bright red anthers.



THE WALLPENNYWORT OR NAVELWORT.

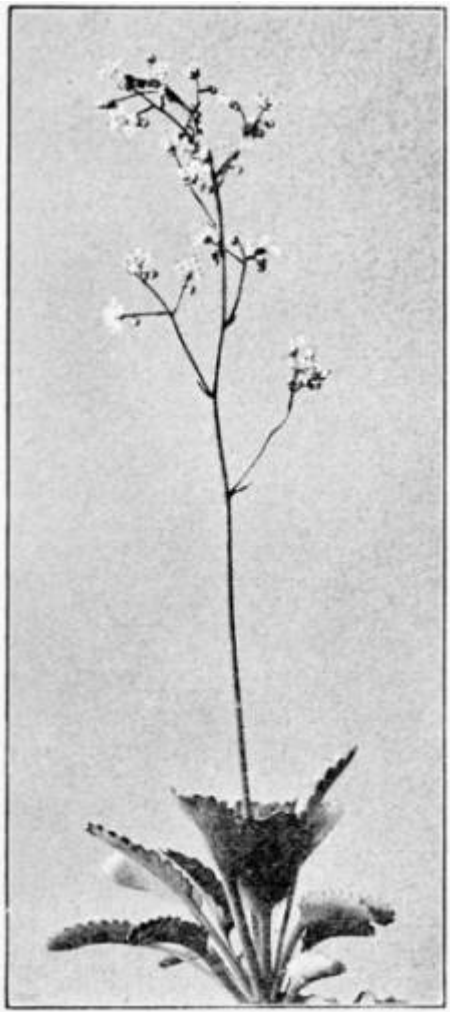
2. The White Stonecrop (*S. album*).—A somewhat similar plant, from three to seven inches high, sometimes seen in large clusters on rocks, walls, and roofs, bearing white or pinkish flowers during July and August. The whole plant is smooth; and its short creeping stock gives rise to short barren stems with crowded leaves, and erect flowering stems with scattered leaves. The leaves are very thick, of a bright green colour, about a third of an inch long, and oblong or cylindrical in form. The panicles are much branched, with, usually, reddish stems; and each consists of numerous flowers with short, blunt

sepals, and narrow, oblong petals about three times as long. This species is not so common as either the last or the following.

3. The Biting Stonecrop or Wall Pepper (*S. acre*).—A smooth plant, of a yellowish green colour, biting to the taste, very common on rocks, walls and roofs, bearing golden yellow flowers during July and August. It has short, barren stems, covered with closely-overlapping leaves arranged in six rows; and erect flowering branches from two to four inches in height. The leaves are very small, thick, succulent, oval or almost globular in form. The flowers, which are in small, terminal, three-cleft panicles, have very short, blunt sepals; and much longer, narrow, pointed petals.

The same order (*Crassulaceæ*) includes the House Leek (*Sempervivum tectorum*)—a plant which has been introduced into Britain, and is now commonly seen growing wild on rocks and on the roofs of country houses. Its spreading offsets give rise to globular tufts of flowerless shoots, and to thick, succulent, flowering stems that grow to a foot or more in height. The lower leaves are ovate, acute, thick, fleshy, edged with red, and arranged in a dense rosette; and the flowering stem, with its sessile leaves, is covered with a short, sticky down. The flowers are of a dull pink or purple colour, and are sessile along the spreading branches of the stem. They have usually about twelve short sepals; the same number of pointed petals, two or three times the length of the sepals; about twice as many stamens; and an ovary of as many carpels as there are petals and sepals. It is interesting to note that half the stamens—those forming the inner whorl—produce no pollen, and that their anthers are often

modified into ovaries, the ovules of which, however, do not mature. This plant flowers in July and August.



THE LONDON PRIDE OR ST. PATRICK'S CABBAGE.

Our last selection from this order is the Wall Pennywort or Navelwort (*Cotyledon umbilicus*)—a peculiar plant, common on rocks and walls in the

South and West of England. It has a hard stock, producing an abundance of fleshy leaves early in the year, and flowering stems, from six to eighteen inches high, from June to August. The lower leaves are round, wavy, smooth, very succulent and brittle, and depressed in the centre where the long fleshy stalks are attached. Those of the stem have shorter stalks which are more and more removed from the centre from below upwards. The stem is thick and succulent, and bears a long raceme of pendulous yellow-green flowers on short stalks. Each flower has a very small calyx of five sepals; a cylindrical corolla, about a quarter of an inch long, with five short teeth; ten stamens, attached to the tube of the corolla; and a superior ovary.



THE MOSSY SAXIFRAGE.

Several of the Saxifrages grow in rocky and stony places, and four or five species are sufficiently common to demand a notice here. The flowers of this group have a calyx of five sepals that is either quite free or more or less adherent to the ovary; a corolla of five petals; ten stamens, attached with the petals at the base of the calyx; and a two-celled ovary, with two distinct styles, containing several seeds.

Our first species is the London Pride, None-so-Pretty, or St. Patrick's Cabbage (*Saxifraga umbrosa*), a native of Irish mountains which has been introduced into Britain as a garden flower, and has now become established as a wild flower in many parts. Its flowering stem grows from six to twelve inches high; and the small white or pink flowers bloom during June and July.



THE IVY-LEAVED TOADFLAX.

The Starry Saxifrage (*S. stellaris*) is a somewhat similar plant, but much smaller, rarely exceeding six inches in height. It is frequent on wet rocks in the North, flowering in July and August. Its leaves are sessile, oblong or obovate, tapering towards the base, thin, and arranged in spreading rosettes; and the stem is leafless with the exception of little bracts at the base of the pedicels. The starlike flowers, larger

than those of the last species, are white, with two yellow spots on each petal, and are arranged in a loose panicle on spreading pedicels. The calyx is adherent to the ovary only at the base, with its segments turned down on the pedicels; and the petals are narrow and spreading.

Another Northern species—the Yellow Mountain Saxifrage (*S. aizoides*)—is abundant on the wet rocks of mountainous districts, flowering from June to September. It is a tufted plant, with branched, decumbent, leafy stems, about six inches long; and crowded, narrow, fleshy leaves, about half an inch long, fringed with hairs at the base. The flowers are yellow, in a loose panicle. The calyx is yellow, like the petals, but much shorter, and erect; and the ovary is adherent to the short tube of the calyx to about half way up.

The Rue-leaved or Three-fingered Saxifrage (*S. tridactylites*) is a small species, rarely exceeding four or five inches in height, common on walls in most parts of Britain, flowering from April to July. The whole plant is usually more or less tinged with red, and its erect stem is covered with fine glandular hairs. The radical leaves are very small, stalked, and undivided; those of the upper part of the stem are also small and entire, but sessile; and the intermediate leaves, lower on the stem, are palmately divided into three or five narrow segments. The small white flowers are placed singly on rather long terminal and axillary stalks; and the hairy calyx, which adheres to the ovary, has five blunt lobes less than half the length of the petals.



THE WALL PELLITORY.

Our last example of this order is the Cut-leaved or Mossy Saxifrage (*S. hypnoides*), a very variable plant, from three to ten inches high, rather rare in South England, but much more common in the rocky parts of North England and Scotland. It has numerous procumbent, barren stems with tufted leaves; and erect flowering stems bearing a few small leaves and a loose cyme of a few white flowers. Most of the leaves are narrow, pointed, entire, about a quarter of an inch long; but the larger ones, at the base of the plant, are about twice as long, and divided into three or five narrow lobes. The calyx adheres to the ovary

to about two-thirds of the length of the latter, and has five lobes about one-third as long as the petals. This species flowers from May to July.

Old walls, ruins, and limestone cliffs are frequently adorned with the pretty flowers of the Snapdragon (*Antirrhinum majus*—order *Scrophulariaceæ*) which bloom from July to September. The plant varies from one to two feet in height, is tufted and leafy at the base, and has erect stems which bear racemes of large flowers. The leaves are very narrow and entire; and the flowers, which are usually white, pink or crimson, are shortly stalked in the axils of the small upper leaves. The calyx is deeply divided into broad lobes very much shorter than the corolla; and the latter consists of a broad tube and two lips, the whole being over an inch in length. The mouth of the flower is closed by a projecting 'palate,' but is easily opened by pressing the flower at the sides between finger and thumb. There are four stamens on the corolla, two longer than the others; and the fruit is an unsymmetrical capsule that opens when ripe by a few holes near the top.

The Ivy-leaved Toadflax or Mother of Thousands (*Linaria Cymbalaria*), of the same order, is a pretty little trailing plant very commonly seen on old walls in many parts of Britain, particularly in the South-West. It will grow luxuriantly in places where there is no soil other than that afforded by the crumbling mortar, and will often establish itself even on new walls so compactly built that it is difficult to see how the plant can find the necessary moisture or how its roots can penetrate the hard material to which it is attached. Its slender stems vary from a few inches to two feet in length, often rooting at the nodes; and its little leaves are smooth, with three or five lobes, and

generally of a purplish colour on the under side. The little flowers, which bloom from May to September, are of a pale blue or lilac colour. The lipped corolla is very similar to that of the last species, with a yellowish palate closing the mouth, but it has a short spur at the base.

The one remaining flower of this chapter is the Wall Pellitory (*Parietaria officinalis*), which belongs to the Nettle family (*Urticaceæ*). It is a somewhat bushy plant, varying from six inches to two feet in height, bearing axillary clusters of small, sessile, green flowers from June to September, and is common on walls and stony banks, more especially in the South of England. Most of the flowers are usually imperfect, and the clusters are surrounded by a whorl of a few divided bracts. The males are few in number, each consisting of a hairy perianth, and four stamens which are jointed and very elastic, springing suddenly and shedding their pollen when touched; the females have a tubular, hairy perianth of four lobes, and a single tufted stigma.

XXI

FIELD AND WAYSIDE IN AUTUMN

From the end of September onward the number of

wild flowers is rapidly decreasing, but still there is much to be seen that will be interesting to the observant student of Nature. Many of the summer flowers are quite over, while others continue to bloom till, at last, they succumb to the intensifying frosts; but hundreds of species of the summer-flowering plants are now in fruit, and some of these are almost as interesting in this stage as when in flower. Many plants will have been observed in flower before any of their fruits were fully formed, but autumn is the season when a large number of these may be seen in full fruit, and watched as they make arrangements for the dispersal of their seeds.

We have already given (p. 12 an outline classification of the various kinds of fruits, and if the reader will study this during the autumn months, and examine the field and woodland plants that fall in his way, he will find abundance of work awaiting him on every country ramble.

A large number of wind-dispersed fruits and seeds are ripe long before the autumn sets in, and have already been distributed by the summer breezes; but now, with fewer flowers to attract attention, one can give more time to the observations of the movements of tufted and winged seeds and fruits as they sail through the air. And, as we brush by the hedgerows and the borders of fields in search of various flowers and fruits, we soon become acquainted with a variety of bristled, hooked, and barbed fruits that are effectually dispersed by the agency of animals, quite a large number of these having securely fastened themselves to our clothing.

Many fruits remain attached to their plants long after the last flowers, and even the leaves, have entirely disappeared. Some of these await the gales of late

autumn and winter, and being now no longer sheltered from the wind, are carried to the spots where they are to produce new plants in the following spring; while sheep and other animals, wandering farther afield in search of food, carry away numerous hooked fruits in their woolly or hairy coats.

The feathered fruits of the Wild Clematis adorn the hedgerows throughout the greater part of the cold season, and form a striking feature of the wayside until they have been dispersed by the winter storms; and the hips of the Wild Rose, as well as the berries and drupes of various shrubs, now rendered more conspicuous by their bright colouring and the absence of foliage, are devoured by birds which afterwards deposit the indigestible and, therefore, uninjured seeds, with their excrement, at some distant spot.

Should the reader be interested in the various ways in which the dehiscent fruits discharge their seeds, he will do well to collect a number of species, as yet unopened, and expose them to the sun in a dry place. He will then be able to note not only the directions and extent of the dehiscence, but also to observe the forcible ejection of seeds by those which split elastically, or which, by other mechanical contrivances, have the power of throwing their seeds a considerable distance.

We may find still another subject for study in the beautiful autumn tints assumed by the leaves of many plants. Such tints are, of course, most conspicuous in the foliage of our forest trees and shrubs; and, when speaking of these, we shall have a word or two to say with regard to the nature of the internal changes that give rise to the beautiful

display of colours; but not a few of the hedgerow herbs and shrubs exhibit tints equally rich and varied. Note, for instance, the pretty Herb Robert, still in flower in sheltered places, its blossoms standing out beyond a background of richly-coloured leaves.

The vigorous summer growth of flowery banks and hedgerows is often closely trimmed with the sickle for the greater convenience of pedestrians and vehicular traffic, all the flowers and overhanging twigs being closely cut, and the wayside thus destroyed from the Nature-student's point of view; but the ground so denuded has recovered itself by the autumn, and a second crop of flowers, arising from the old stocks, often later than their normal season, is frequently the result.

A considerable number of summer flowers continue to bloom during the autumn months, while a few are truly autumnal, and are not to be found till the summer has nearly or quite passed.

In corn-fields we may still meet with the beautiful Pheasant's-eye (*Adonis autumnalis*), and in fields the Hairy Buttercup (*Ranunculus hirsutus*), the Daisy (*Bellis perennis*) and the Red Hemp-nettle (*Galeopsis Ladanum*) are yet in flower, while the Annual Meadow Grass (*Poa annua*) continues to produce new flowers to the end of the year.

On sunny banks in chalk districts we still see the delicate Rock Rose (*Helianthemum vulgare*); and on banks almost everywhere the Wild Clary (*Salvia Verbenaca*), and the still more hardy Milfoil (*Achillea millefolium*), Knapweeds (*Centaurea nigra* and *C. Scabiosa*), Field Scabious (*Knautia arvensis*), Dark Mullein (*Verbascum nigrum*) and the Toadflax (*Linaria vulgaris*).

Then, on downs and heaths we find the Yellow Bedstraw (*Galium verum*), the crimson flowers of the Fine-leaved Heath (*Erica cinerea*), and the rose-coloured or white blossoms of the Heather or Ling (*Calluna vulgaris*): also the Carline Thistle (*Carlina vulgaris*), with its inner involucral bracts broadly spreading while the sun shines, but bent inwards to protect the florets during dull weather when the insects are at rest, the lilac flower-heads of the Devil's-bit Scabious (*Scabiosa succisa*) and the Small Scabious (*S. Columbaria*), and the conspicuous flowers of the Chamomile (*Anthemis nobilis*), all standing out in bold relief against the background of autumnal foliage.

Still more numerous are the autumn flowers of the waysides. By the dry and dusty roadside we see the yellow flowers and silvery leaves of the Silver-weed (*Potentilla anserina*), the little starlike flowers of the Chickweed (*Stellaria media*), the yellow flower-heads of the Dandelion (*Taraxacum officinale*), Sow Thistle (*Sonchus oleraceus*) and Groundsel (*Senecio vulgaris*), the straggling Knot-grass (*Polygonum aviculare*), the Spotted Persicary (*Polygonum Persicaria*), the Shepherd's Purse (*Capsella Bursa-pastoris*), the Scentless Mayweed (*Matricaria inodora*), the Chamomile (*Anthemis nobilis*), the White Goose-foot (*Chenopodium album*), and Oraches (*Atriplex hastata* and *A. patula*). Where the soil is more generous we find the Herb Robert (*Geranium Robertianum*), the Fleabane (*Inula dysenterica*), Red and White Dead-nettles (*Lamium purpureum* and *L. album*), and the Petty Spurge (*Euphorbia Peplus*); while on old walls the Pellitory (*Parietaria officinalis*) is still in flower.

XXII

AUTUMN IN THE WOODS

Although several of the flowers mentioned in the last chapter as blooming during the present season may be seen along the borders of woods, yet within the wood itself we are struck by the almost total absence of flowers. This loss, however, is compensated for by the beautiful and varied tints assumed by the leaves of the trees and shrubs.

Important changes are now taking place in these perennial members of the vegetable world in preparation for the coming winter. The temperature of the soil is becoming considerably reduced, and, as a result, the absorbing activity of the roots is greatly decreased, while the winter is coming, when the temperature will be so low at times that the circulation of the sap will practically cease. If the leaves remained on the trees, they would give off from their surfaces more water than the trees could obtain from the soil through their inactive roots, thus endangering the lives of the trees. The leaves, therefore, must be shed. But these leaves contain a considerable amount of nutritious material which they themselves have built up, and which should not be lost. They contain starch, albumen, and other compounds which would be entirely lost to the trees if the leaves were shed in their present condition, except that a small proportion, in the form of products of decomposition, might be re-absorbed.

This being the case, arrangements must be made, first, for the passage of the nutritious material in the leaves to some other part of the tree where it can be

stored for the winter; and, second, for the removal of the leaves as the roots become less active.

So, before the time of leaf-fall, the nutritious substances in the leaves, including the *chlorophyll* to which the leaf owes its green colour, become changed, and pass back to the stems or the root, where they can be safely stored for the winter. The leaves, thus impoverished, become mere skeletons—mere collections of empty, lifeless cells; and if no further change takes place, they assume a very pale colour, like the leaves of the Hornbeam, Birch, and the Willows.

But the transfer of the nutrient matter from leaf to stem or root is accompanied by numerous chemical changes by which new compounds are formed. Among these new substances a dark blue compound called anthocyanin is produced in some plants; and where this exists in considerable quantities we find the leaves of a dark bluish-green colour, like that of the autumn foliage of the Pine.

Acids are also sometimes formed as a result of the complicated chemical changes that take place during the transfer above described; and these react on the anthocyanin present, changing its colour to a tint that varies according to the proportion and quantity in which they exist.

Thus, if anthocyanin is present, together with a small amount of acid, the leaves are turned violet, as in the case of the autumn leaves of the Dogwood and the Spindle Tree; or purple, like those of the Service Tree. A larger proportion of acid produces, with the anthocyanin, the brownish green tint of the Alder leaves; or the brownish yellow of the Oak; while still larger proportions will turn the anthocyanin yellow, orange, red, or scarlet, according to the quantity in

which the latter is present. Thus we can account for the rich yellow of the Maple in autumn, the orange of the Aspen leaves, the beautiful scarlet tints of the Mountain Ash and the Barberry, and the grand display of varied colours exhibited by the autumn Beeches.

Again, before the leaves are shed, the buds that are destined to produce the new branches of the following spring are already formed. These may be seen on all deciduous trees and shrubs, some of them in the axils of the leaves, and others at the tips of the present twigs. Each bud is the embryo branch of the following year. Some of them are destined to produce leafy branches only; some are to develop into branches bearing both floral leaves and flowers; while others are to produce flowers without floral leaves; and it is interesting to note that, even at this stage, sections of the buds, examined with the aid of a microscope, will reveal the future leaves and flowers compactly concealed within their scaly, protective coverings.

In October we may see the well-formed catkins of the Birch that are to bloom in the following April, in company with the ripe fruiting catkins of the present year. The Alder also bears its catkins that are to flower five months later, together with the woody remains of the female catkins of the previous spring; and the Hazel may be seen with its ripe nuts and its future flowers both on the same twig.



THE ALDER IN AUTUMN, WITH THE CATKINS WHICH MATURE IN THE FOLLOWING SPRING.

The leaves, having manufactured the materials necessary for the formation of the buds that are to produce the leaves and flowers of the following year, and then transferred their remaining store of nutrient matter to a suitable storehouse for the winter, are now practically empty and lifeless. Had they remained alive and active, they would have endangered the life of the tree by giving off more moisture than could be replaced by the inactive roots. In their present, lifeless condition they are useless to the tree; but by falling to the ground, and decomposing where they lie, they improve the soil by the addition of organic matter as well as of the mineral salts they contained.

In countries where a moderate temperature is maintained throughout the year, the growth of plants

and trees goes on without interruption, and the fall of the leaf is hardly noticeable; for the older leaves die and fall one by one, as they become incapable of performing their functions for want of light, and new ones are being continuously formed close to the tips of the twigs. But where the growth is interrupted, either in hot countries during periods of drought, or in temperate countries by the approach of a cold season, the whole of the foliage is shed within a short period, and new leaves as suddenly appear when favourable conditions return.

In our own latitudes, as we all know, the defoliation of the trees is caused by the approach of cold weather, which decreases the activity of the roots, so that the leaves become dry and lifeless. It is very commonly supposed that the fall of the leaf is caused by frost; but this is not the case. The leaves are shed during the cool days of autumn, even though the temperature does not fall to freezing point; but it is equally certain that the leaf-fall is accelerated by the frost when it comes, for the little moisture remaining in the leaves is then frozen, rendering the structures so brittle that they are easily snapped by the wind.

The real cause of the rupture of the leaf is the formation of what is called the '*separation layer*.' This consists of soft, succulent cells, really in several layers, which are formed across the leaf-stalk, usually at the base, where the bundles of vessels passing from the twig to the leaf are narrower. The walls of these cells are thin, and are easily separated; and as they extend inwards from the surface all round, they break through the old cells, thus weakening the junction. When the growth of the separation layer is complete, it requires very little force to break off the leaf, and the process is aided by the formation of

certain organic acids which act on the cell-walls, causing them to dissolve; and when the leaf has finally separated from the twig, it will be found that the scar left is a clean-cut surface, such as would be produced by the incision of a sharp knife.

The recognition of the above facts introduces to us a difficulty for which we can find no explanation:—If the leaf-fall is not caused by frost, but by certain structural alterations that take place in the tree itself, how are we to account for the fact that the tree produces the changes which are necessary for its own preservation every year, just at the proper season? Plants and trees do not foresee the coming period of cold weather that necessitates the performance of the functions which they execute, and yet they instinctively prepare for the winter in the manner described above.

Our autumn observations teach us that there are interesting differences in the times and progress of leaf-fall of different species of trees, and also of trees of the same species when exposed to different external conditions. On open ground, where the trees are fully exposed both to the sun's rays and to the cool autumn breezes, the leaves lose their moisture and fall earlier than would the same species in more sheltered situations; and they retain their moisture and position latest in damp, shady woods. On high hills, where the exposure is extreme, the leaves, which, by the way, do not appear till late in the spring, fall early on account of the low temperature, and consequent decrease of root activity, in the autumn.

Further, we note that while in some trees, such as the Ash, Hornbeam, Beech and Hazel, the leaves fall first at the tips of the branches, and the defoliation

extends fairly regularly towards the trunk, in other species, including Willows, Poplars, and the Lime, the branches become bare first at their bases, and finally at their tips.

Even during the depths of winter we may see a number of dead leaves still attached to the twigs of certain trees, notably the Oak and the Beech; but where we find practically all the foliage remaining on the tree or on special branches of a tree, we may generally assume that the tree, or the branches in question, are dead—that they died during the summer, before the separation layers of the leaves had been formed. We can also understand, from what has been said, why the dead leaves remain attached to a cut branch, and yet fall from the living tree from which it was severed.

In our own country some plants and trees retain their leaves throughout the year, so that we speak of them as evergreens. Many of these include herbaceous plants of a hardy nature, some of which remain fresh and green even in exposed situations, while others grow in more sheltered places. In either case they are plants whose roots remain more or less active in the cold season; and some of them, especially the evergreen shrubs, have rather thick leaves which contain a considerable quantity of sap, and which are surrounded by an outer covering or epidermis that does not allow the water within to pass out so readily as in the case of the deciduous leaves.

In addition to the observations previously mentioned, we should do well, at this season of the year, to study the autumn fruits of our trees and shrubs, most of which still remain attached to the twigs.

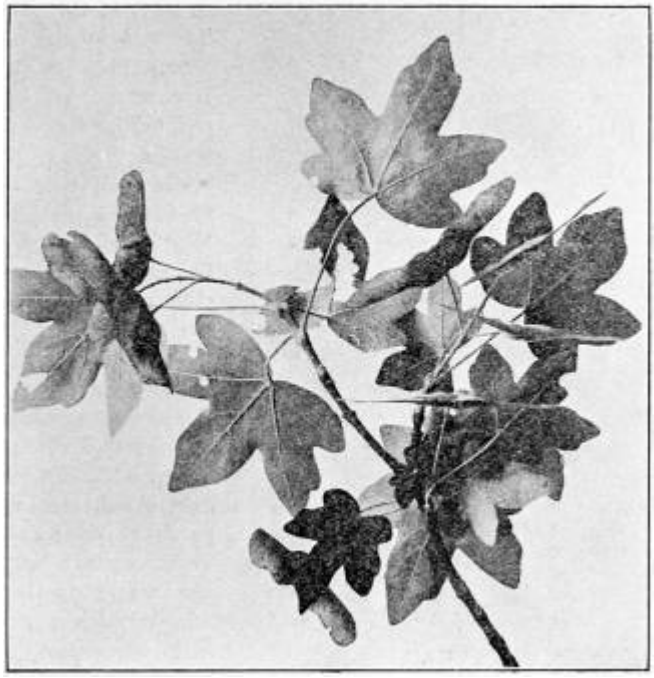


THE ASH IN AUTUMN, WITH ITS 'KEYS.'

Some of these fruits lose most of their moisture as they ripen, thus becoming very light, and are provided with wings that cause them to be dispersed more or less by the wind.

The so-called 'keys' of the Ash are one-seeded fruits, extended at the end into a long, narrow wing with a slight twist. As a result of this peculiarity they usually fall less rapidly to the ground, spinning as they descend, and are thus carried farther than they otherwise would be by the wind. The fruits of the Sycamore and the Maple are somewhat similarly winged, and each of these consist of two carpels which separate sooner or later—generally after they

have reached the ground.



THE MAPLE IN FRUIT.

On the Birch trees we may now see the ripe female catkins, consisting of hundreds of minute fruits, closely packed together, each provided with a wing on either side. They are very light, and easily blown a considerable distance by the wind; and late in the autumn we may observe the stalks of the catkins, from which some of the fruits have been blown, still on the trees.

The wings that thus aid in the dispersion of fruits are not always part of the fruit itself. In the Hornbeam it is a three-lobed, persistent bract that performs this function; and the fruits of the Lime are also blown away by the aid of a large bract from the middle of

which the fruit-stalk projects.



THE WAYFARING TREE, IN FRUIT.

Some of our trees present a glorious aspect during the autumn months, displaying conspicuous and more or less brightly-coloured fruits in combination with the varied autumn tints of their leaves. The red foliage of the Mountain Ash or Rowan is accompanied by the still brighter clusters of scarlet fruits—little apple-like pomes, about the size of holly 'berries'; and the Wayfaring Tree bears pretty clusters of flattened, oval, one-seeded berries which are first red, and then nearly black. The Guelder Rose, while

still in full leaf, is often very heavily laden with its bright red, semi-transparent berries; and the violet foliage of the Dogwood is intermingled with clusters of little berry-like drupes which, at first green, have now changed to a rich purple-black. Then there is the Spindle Tree, with its pretty red lobed capsules which split, when ripe, at its angles, disclosing as many cells as there are lobes (usually four), each with a single seed enclosed in an orange jacket. Occasionally we meet with the Strawberry Tree, during early autumn, bearing both flower and fruit at the same time. This tree flowers in September and October, but the fruits which accompany the flowers are those of the previous year, for they require more than twelve months to come to maturity. The fruit is a large berry, of an orange-red colour, with a granulated surface that gives it somewhat the appearance of the strawberry. It should be mentioned that the Strawberry Tree is not indigenous to England, and is seldom seen outside parks and gardens; but it grows wild in Ireland, and is very abundant round Killarney and in other parts.

In conclusion, we must note one autumn flower of the woods which is exceedingly common—that of the Ivy (*Hedera Helix*), belonging to the order *Araliaceæ*. The Ivy is an evergreen climber, fixing itself by means of little rootlike suckers attached to the main stem and its branches, while the lower branches trail along the ground. The leaves are thick and glossy, usually of a deep green colour, but often beautifully variegated. Those attached to the trailing and climbing stems have three or five lobes, are always turned with one surface towards the light, and are so arranged as to obtain the maximum of light, the less exposed leaves below catching the rays which pass between the lobes of those which are more

favourably situated.



THE STRAWBERRY TREE IN FLOWER, WITH THE FRUITS (ALMOST RIP
OF THE PREVIOUS YEAR.

The branches of the tree do not, as a rule, produce flowers as long as they are able to climb; but as soon as they reach the summit of the tree or wall to which they cling, or reach a situation where there is a sufficient abundance of light and air, they change their character in a remarkable way. They now become bushy, cease to produce suckers, and give rise to undivided leaves that turn in all directions for light and air. At the tip of each twig is formed a cluster of yellowish-green flowers, arranged in a

short raceme or in an umbel. These flowers have an inconspicuous calyx which forms a border round the middle of the ovary, and five short petals. There are also five stamens, and united styles. The fruit is a smooth, black berry, containing from two to five seeds.

XXIII

PARASITIC PLANTS

A number of plants extract more or less of the organic material they require from other plants, and thus save themselves the labour of building up this material themselves. These are termed parasites; but we must be careful to distinguish between them and certain other plants which, though apparently parasitic, are not really so. One plant may climb on another, perhaps even producing "rootlets" by which it clings to its living support, and yet it may not be a parasite in the proper sense of the term, for it may not absorb the slightest amount of nutritious matter except from the soil and the air. It is not at all uncommon for the Honeysuckle to twine its stems round the trunk and branches of a young tree, with the result that the tree becomes stunted, and assumes a starved appearance, especially in its lower parts; and yet the Honeysuckle is not a parasite. It has withdrawn nothing from the tree which supports it,

but has coiled itself so tightly round it as to interfere with the circulation of its sap. The lower part of the tree is especially affected because the strangulating coils of the climber prevent the downward flow of the sap contained in the vessels of the bast or inner bark, and this is the sap which holds the constructive materials that have been built up in the leaves, under the influence of light.

Many of the parasitic plants are of microscopic dimensions, and others are larger species belonging to the Fungi or Mushroom group. Some, however, are flowering plants, and these only fall within the scope of our work.

We shall first deal with parasites which have no green leaves or chlorophyll, and are therefore entirely dependent on outside sources for their supply of organic material, starting with the interesting Dodders (*Cuscuta*), which coil themselves round herbs, shrubs, or even trees, and produce sucking organs on their stems that come in contact with their host.

These are all smooth plants, with globular clusters of yellowish-pink flowers, the calyx being of the same colour as the corolla. The former is deeply divided into four or five parts, and the corolla has four or five spreading lobes with as many scales inside its broad tube. The ovary has two distinct styles, and the fruit is a globular capsule. The following summary of distinguishing features will enable the reader to identify the British species of the genus:—

1. The Greater Dodder (*Cuscuta europæa*).—A plant of a greenish yellow colour, generally more or less tinged with red, with flowers in sessile, globular clusters nearly half an inch in diameter, each individual flower being about a tenth of an inch. This

species is not abundant. It may be met with in hop-fields, and is also parasitic on nettles, various shrubs, and trees, including the elder and the ash.

2. The Flax Dodder (*C. Epilinum*).—Very much like *C. europæa*, but the flowers are fewer in number, larger, and more fleshy. The calyx is nearly as long as the corolla, with sharply-pointed segments; and the corolla tube is always globular. This species is not indigenous, but is sometimes met with in flax-fields.

3. The Lesser Dodder (*C. Epithymum*).—A more slender plant, with thread-like stems, and flowers in small, compact, globular heads, with red calyx and cylindrical corolla. This species occurs principally on sunny heaths, where it is parasitic on shrubby plants, such as thyme and ling. It is much more common than the foregoing.

4. The Clover Dodder (*C. Trifolii*).—Very much like the Lesser Dodder, of which it is sometimes regarded as a variety. Its calyx is of a very pale colour, and is almost as long as the tube of the corolla, which is cylindrical in form. It is rare, but sometimes appears in undesirable numbers in clover fields.

All the species produce their flowers in August and September, but *C. europæa* may often be seen in bloom very early in July.

The seeds of the Dodder fall from the opened capsules during late summer and early autumn, alighting on the soil, or on the decomposing foliage that covers the ground, or on the rough barks of the tree that served as a host for the parasitic plant. The seeds of many other plants fall about the same time, but those of the Dodder do not begin to germinate until about a month later than the majority of these, in the following season, and consequently the young

Dodder plants do not appear before their future hosts have had time to grow sufficiently large to support and nourish them. Perennial plants, too, which are attacked by the Dodder, have also produced strong shoots and leaves from their roots or underground stems by the time that the parasite begins its search for ready-made organic food; and it is clear that if the Dodder seeds germinated earlier in the season, the young plants would starve for want of suitable herbs to give them support and nourishment.



GREATER DODDER, ON NETTLE--A COMPLETE PLANT.

When the seed germinates it sends out a filament which penetrates into the soil and fixes the seedling firmly. The other end grows upward, carrying up with it a little swollen mass of food-reserve, sufficient to support the growing seedling until it has had some chance of reaching a suitable host. The upper end of the seedling now sends out a filament which rapidly elongates, and, growing upward, searches for some stem on which to climb.

All this time the little mass of food-reserve is being rapidly exhausted, and if the young seedling fails to reach a suitable plant on which to climb it soon dies, for its lower extremity is unable to absorb sufficient food material from the soil; and the plant itself, having no chlorophyll, cannot decompose carbonic acid gas and build up organic material to add to its substance.



THE CLOVER DODDER, WITH A SEPARATE CLUSTER OF FLOWERS REPRESENTING THE NATURAL SIZE.

Again, should the young plant fail to reach a favourable support, so that it is of necessity compelled to trail along the ground, the filaments which would soon produce suckers when attached to a living plant have no power to form any structures capable of extracting food material from a damp soil.

Circumstances being more favourable, however, the upper filament eventually finds a stem, and immediately begins to twine itself round it, making a few close coils in a clockwise direction. Should the support prove to be a dead stem, little wartlike

swellings are produced at points where the two touch, and these serve as a means of attachment for the climbing filament, but no suckers are formed. If, however, the filament surrounds a living stem, each of the swellings gives rise to suckers that penetrate into the tissues of the latter, and withdraw the organic food necessary for the continued existence of the plant.

The Dodder now grows rapidly, giving off branches which search in all directions for additional supports, sometimes climbing from one plant to another, and producing new suckers whenever a favourable situation has been reached. The plant has now all it requires both in the way of mechanical support and nourishment, and its lower part, thus rendered useless, soon withers, breaking all connexion with the soil on which the seed originally germinated. New branches continue to form, each one producing additional suckers for the extraction of food from the host or hosts, until a tangled mass of clinging stems is the result. Then the globular clusters of little flowers appear, followed by balls of small capsules which throw off their lids when ripe, allowing the seeds to be shaken out by the wind. The Dodder plant now withers, leaving, in the autumn, its dead tangles of climbing filaments still attached to the withered herbs on which it fed, or to the branches of the tree which served as its host.

Other parasitic plants possessing no chlorophyll, and therefore incapable of building up organic compounds for themselves, derive their food from the roots of trees and shrubs.

Among these is the Toothwort (*Lathræa*), which is carnivorous as well as parasitic, and is described in our chapter (XXIV) dealing with carnivorous plants,

so that we need only refer here to its habit as a parasite.

The seed of this plant germinates on the damp ground to which it falls in early summer. The young root penetrates into the soil, deriving its nourishment entirely from the food reserve that was stored up in the seed, and soon sends out lateral branches in search of the roots of a suitable host. If it fails to attain this end by the time that the reserve is exhausted, it dies; but if it succeeds in reaching the root of an Elm, Hazel, Hornbeam, Ash, Poplar, or other tree, it fastens itself to it, and develops suckers which penetrate into the substance of the root to extract its sap. The parasite now grows very rapidly, producing its underground stems, with their fleshy, overlapping scales, as described on p. 352.

The Broomrapes of the same order (*Orobanchaceæ*) are very similar in their parasitic habits to the Toothwort, and, like the latter, they possess no chlorophyll. The seeds germinate on the damp soil, producing a long, narrow embryo that grows downward into the ground until it reaches the root of some herb or shrub. It then gives off suckers which penetrate into the root, and, with the aid of the organic food thus obtained, forms a tuberous swelling on its surface. Flowering stems are afterwards produced, and these, rising above the soil, bear terminal spikes of lipped flowers, followed by capsules containing many seeds.



THE GREAT BROOMRAPE.

There are several British species of this genus (*Orobanche*), and their flowering stems, which are usually unbranched, produce scale-like leaves of the same colour as themselves. Each flower of the spike is in the axil of a bract resembling the scales of the

lower part of the stem; and in some species there is a pair of smaller bracts close to the base of the calyx. The corolla is either tubular or bell-shaped, and more or less distinctly lipped. Each flower has four stamens, arranged in pairs, and a two-lobed stigma. The following outline of leading features will serve for the identification of the common Broomrapes:—

1. The Great Broomrape (*O. Rapum*).—A plant from twelve to eighteen inches high, of a pale yellow colour at first, but afterwards turning to a dull purple brown. Stem thick, especially below, and unbranched. Scales lanceolate. Flowers sessile, whitish, with only one bract, forming a spike from six to nine inches long. This species is moderately common, and is parasitic on the roots of Furze and Broom. Time of flowering—May to July.

2. The Clove Broomrape (*O. caryophyllacea*).—Very similar to the Great Broomrape in colour, but usually smaller, and easily distinguished by the sweet clove-like scent of its flowers. Spike not so dense as in the last species, and the corolla tube not so broad. The plant is not uncommon in the southern counties of England. It is parasitic on the roots of the Great Hedge Bedstraw, and flowers from May to July.

3. The Tall Broomrape (*O. elatior*).—Also much like the Great Broomrape, of which it is perhaps a variety. It retains its original yellowish colour for a longer period, and is parasitic on the Great Knapweed, flowering from June to August.

4. The Least Broomrape (*O. minor*).—A yellow or pale brown plant, from six inches to over a foot in height, more slender than the preceding species, with smaller flowers. The flowers are whitish, but more or less tinged with purple, and bloom from June to October. It is parasitic on a number of different

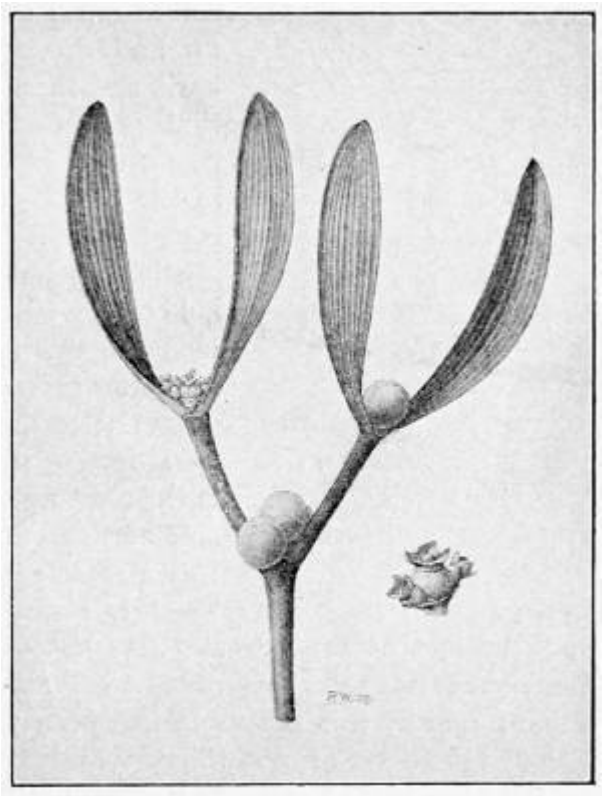
plants, including the Ivy, Clovers, Hawkweed, Wild Carrot, &c., and is found in many districts in South and Central England.

We have now to consider those parasites which bear leaves possessing chlorophyll granules, and are therefore able to build up a portion of the organic compounds necessary for their development. Most of these, at least as far as the British flowering species are concerned, have also true roots which grow into the soil and absorb mineral food, like those of the non-parasitic plants allied to them, so that it is difficult to understand why they should require the additional nourishment stolen from the roots of neighbouring plants. One, however, the well-known Mistletoe, grows on trees at a distance from the ground, and therefore obtains the whole of its food, with the exception of carbonic acid gas, direct from its host.

This plant—the Mistletoe (*Viscum album*), of the order *Loranthaceæ*—is attached to the tree on which it grows by a thick stem that becomes woody when old. Its branches are of a yellowish-green colour, and are repeatedly forked in such a manner as to form a dense tuft that often reaches a diameter of two feet or more. The leaves are of the same colour as the branches, and are rather thick and fleshy. The flowers grow in the forks of the branches, on very short stalks, and are imperfect, the males and females being on separate plants. The former are in clusters of about three or four, in a cuplike, fleshy bract, each flower having four thick, triangular petals with an anther on the middle. The females are

either solitary or in clusters of two or three, with a similar bract, and very small petals. The fruit is a white, glutinous berry, almost transparent, with only one seed.

The Mistletoe grows on a variety of trees, including the Apple, Pear, Black Poplar, and Oak; and thrives most luxuriantly on those which have a soft tissue beneath the bark. It is found principally in the southern and western counties of England, and flowers from March to May.

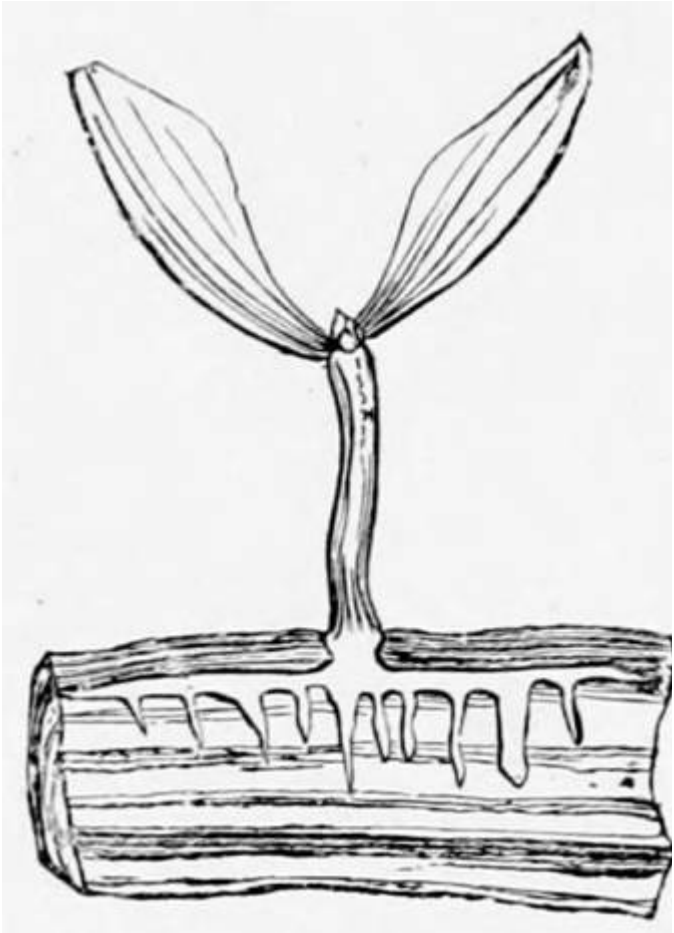


MISTLETOE.

There is no doubt but that the seeds of the Mistletoe are distributed from tree to tree by the agency of birds, especially the thrushes, which devour the berries in large numbers. The seed of the berry is protected by a covering which remains quite untouched by the digestive fluids of the bird, and consequently it is expelled intact with the excrement, and frequently drops to a branch of the tree, where it lodges in a crevice of the bark, and is securely fixed in its place by the slimy excrement in which it is embedded.

Here the seed germinates, sending out a little rootlet that always turns towards the bark on which it rests, and subsists for a time on the food-reserve that it contains. When the young root reaches the bark it becomes flattened against the surface, and spreads out, forming a disc that holds the seedling firmly to the tree.

A projection (the *sinker*) is then sent inwards from the disc, and this penetrates the bark, reaching the wood beneath, but does not enter the latter. This terminates the growth of the seedling for the first year, but as soon as the warm weather of the following spring commences, the sinker begins to spread over the surface of the outer ring of wood, while at the same time a new annual ring of wood begins to form outside, thus surrounding and banking in the sinker. It would appear, on making a section of the tree, as if the sinker had actually pushed its growth through the outer ring of wood, whereas it does not penetrate the wood at all, but is only banked up by the new wood that grows round it. This is repeated year by year, until the sinker is at last quite deeply set in the branch, being surrounded by the wood of several annual rings.



A Young Mistletoe Plant on the Branch of a Tree. The Branch is Cut Longitudinally to Show the Suckers.

During the second year's growth the sinker sends out little roots which run up and down the stem, beneath the bark, and these give rise to new sinkers that grow down to the surface of the wood, and become, in turn, embedded in the new layers of wood that form round them. And while the young Mistletoe plant is thus securing a firm hold on its host, and

withdrawing ready-made organic compounds from its sap, the outer green stem develops, and soon gives rise to the first pair of leaves.

If food is obtained in abundance, as is the case when the host is a tree of a soft and sappy nature, the growth is rather rapid; but otherwise the development is comparatively slow. In any case the age of the parasite may be ascertained by counting the number of annual rings of wood that lie outside the deepest sinker; and by this means it has been found that the Mistletoe may attain an age of over thirty years.

We have now to consider a group of plants, the parasitic habits of which would scarcely be suspected by an ordinary observer. They are green plants, with well-developed foliage leaves, and true roots which absorb mineral food from the soil. Their seedlings grow in the same way as those of non-parasitic species, deriving no nourishment from neighbouring plants, but obtaining all their food from the air and the soil, and building up all the organic compounds required for their growth by the agency of their own chlorophyll.

It is difficult to understand why these plants should afterwards produce suckers on their roots in order to obtain nourishment from other species, but they do this, and experiments have proved that the food thus obtained is more or less essential to their development. Some of them die while still young if grown apart from other species, and the others, under similar conditions, though they reach what we may term the adult stage, remain somewhat weak and stunted, and produce but few flowers and fruits.

Most of the plants referred to belong to the order *Scrophulariaceæ*, and among them we may mention

the Eyebright (*Euphrasia*), the Yellow Rattle (*Rhinanthus*), the Cow-wheat (*Melampyrum*), and the Lousewort (*Pedicularis*). They generally appear in large numbers close together, often in such abundance as to determine the general colour of the ground on which they grow, and yet they do not apparently cause much damage to the grass and other plants which they rob.

These green parasites are described in various chapters, according to their habitats and their flowering seasons; so we shall do no more here than to briefly refer to their parasitic habits.

The Eyebright (p. 274) grows on heaths and downs, where it derives organic food from the roots of the neighbouring grasses. The Lousewort, too (p. 118), which grows in marshes and moist meadows, is parasitic principally on the roots of grasses, apparently without affecting the latter. The last-named species is a perennial, the roots of which have to find hosts that are capable of supporting it year by year. If the host of the present year should happen to die in the autumn, the suckers that were attached to its roots soon die, and the parasite has to seek a new source of supply. This it does by extending its roots until it reaches a new host, and then producing new suckers. Thus we are able to understand the origin of the long roots so often seen on the Lousewort, and also the reason why these roots never grow downwards into the soil, but always horizontally, just beneath the surface. Further, since the roots extend themselves in search of food at times when the supply is temporarily diminished or stopped, it is clear that some reserve is necessary for the elongation referred to. Such a reserve exists in the older, thick portion of the perennial root, near the

base of the stem.

In the case of the Cow-wheat (p. 146) no suckers are produced until the lateral branches of the root of the seedling reach a moderate length; but in order to increase the chances of finding a suitable host these branches are developed in large numbers, and extend themselves in all directions. The suckers produced on them cling very firmly to the root-fibres of the host, which they almost completely embrace.

The suckers of the Yellow Rattle (p. 118) are globular, often nearly one-eighth of an inch in diameter, and partly surround the root-fibres of the plants to which they are attached.

XXIV

CARNIVOROUS PLANTS

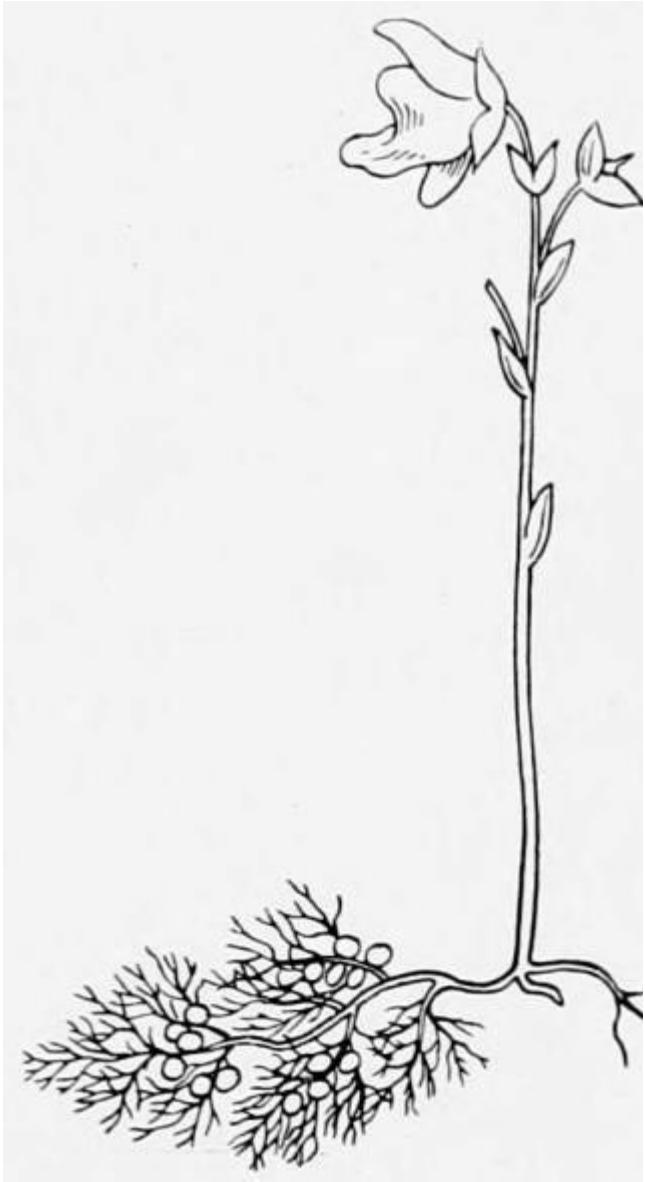
Quite a number of plants, belonging to different orders, are provided with the means of capturing small animals, and of digesting their prey and absorbing the nutrient matter thus obtained into their own systems. In this way they are enabled to obtain nitrogenous material which, in the ordinary way, is absorbed in the form of mineral solutions, from the soil, by the agency of the roots. The greater number of these carnivorous plants are to be found in tropical lands; but a few are British, and are of

such an interesting nature that we propose to devote a short chapter to a description of their peculiar structure and habits.

The plants to which we refer are often spoken of as insectivorous species; but although in nearly all cases the animal food consists almost entirely of insects, it is not entirely derived from this one group of animal life, and therefore the term carnivorous is rather more appropriate.

In pools we sometimes meet with floating plants that have no true roots, at least at the time of flowering, but consist of a tuft of long, rootlike, submerged branches, bearing much-divided leaves, and sending leafless stalks of yellow flowers above the surface of the water. These plants are the Bladderworts (*Utricularia*), of the order *Lentibulaceæ*, and are so called because they have little air-bladders either attached to the leaves or supported on leafless branches.

The leaves are divided into numerous very narrow segments, thus presenting a proportionately large amount of surface to the water for the absorption of dissolved gases required by the plant; and the flowers consist of a deeply two-lobed calyx; a spurred corolla, with its mouth closed or nearly closed by means of a convex 'palate'; two stamens; and a one-celled ovary that ripens into a globular fruit.



The Greater Bladder-Wort.

As to the little air-bladders mentioned above, they

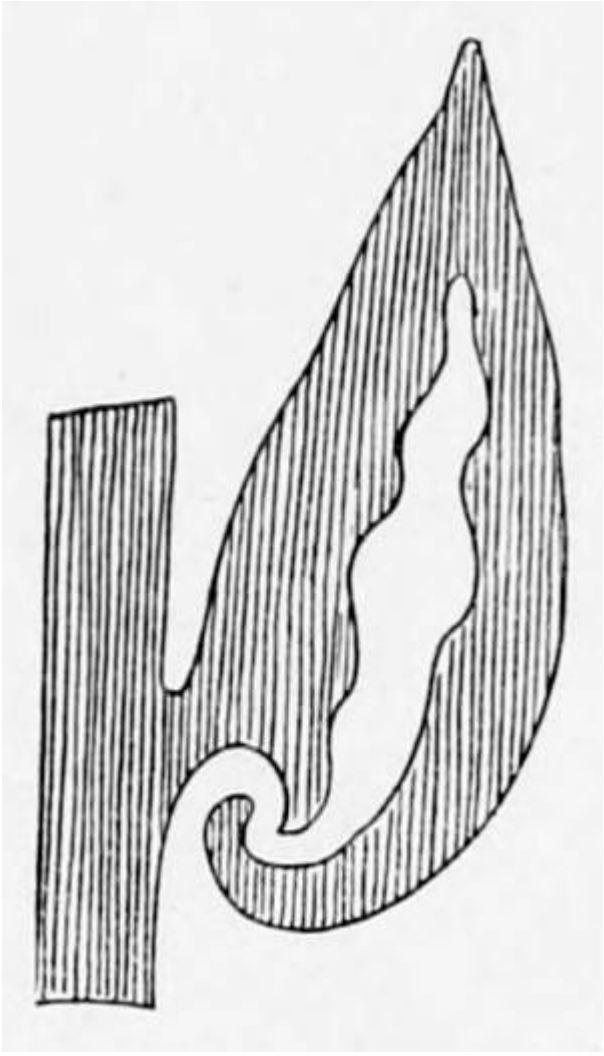
form, perhaps, the most interesting feature of the plant, for they are the traps by means of which small aquatic creatures are caught, and also the organs concerned in the absorption of nutritive products derived from the prey. Each bladder has an opening, guarded by a kind of valve which allows easy ingress, but no exit. It does not seem to produce any secretion which would hasten the death of the creatures entrapped, nor does it appear to produce any kind of digestive fluid, as is the case with other carnivorous plants; but small aquatic creatures, such as water-fleas, cyclops, very small larvæ, &c., entering the bladders for shelter or some other purpose, are securely imprisoned until they die of starvation or suffocation; and their bodies then decay, giving rise to soluble gases and other products which are absorbed into the plant by special cells within the bladder.

There are three British species of these plants—the Greater, the Lesser, and the Intermediate Bladderworts. The first of these—*Utricularia vulgaris*—is rather local in its distribution, and is easily distinguished from the other two by its superior size, having floating branches from a few inches to a foot in length. The second (*U. minor*) is much more common. Its floating branches are only two or three inches long at the time of flowering, but they grow longer after; and the flowers are pale yellow, with a short, broad spur. The third (*U. intermedia*), which is very local, has also pale yellow flowers, but with a much longer spur; and the bladders are at the ends of leafless branches.

In the preceding chapter we gave an account of certain plants which are parasitic on other plants and trees, deriving more or less of their nutriment from

their vegetable hosts. One of these—the Tooth-wort (*Lathræa squamaria*), of the order *Orobanchaceæ*—is not only a parasite, deriving nourishment from the roots of trees, but is also a carnivorous species, feeding on minute animals which are captured and digested by its peculiar leaves; and therefore it may be conveniently considered here.

The whole plant is of a fleshy character, and lives entirely underground, attached to the roots of the Hazel, Elm, or other tree, except during April and May, when it sends up thick flowering stems, from four to ten inches high, bearing a few broad, fleshy scales which gradually pass into bracts, and a one-sided spike or raceme of flowers. The stem and scales above ground are of a pale rose colour, and the flowers are either brown, flesh-colour or slightly bluish. The latter are numerous, closely placed, and either sessile or shortly stalked. The calyx is bell-shaped, nearly half an inch long, with four broad lobes; and the corolla, which is about half as long again as the calyx, is distinctly lipped.



Longitudinal Section (Enlarged) Through a Leaf of the Tooth wort.

The whole plant is devoid of chlorophyll, and consequently has not the power of building up organic compounds after the manner of green plants; and, being parasitic on the roots of trees, it derives

but little organic material from its host. To compensate for this the underground portion is so constructed that it can capture minute animals which exist in the soil, and has the power of digesting them and of absorbing the products of digestion.

The underground stems are quite white, and are thickly covered with broad, cordate, fleshy leaves that closely overlap one another. There appears to be nothing very remarkable in these underground leaves until one has been removed from the stem and closely examined; and then we find that what appears to be the apex of the leaf is really its middle; and that what seems to be, at first sight, the under surface, is really an extension of the upper side; for the leaf is bent backwards in such a manner as to bring its apex close to the stem, immediately below its base. This peculiar folding of the leaf results in the formation of an irregular cavity, and the tip of the leaf, brought close to its base, is curled upward, close to the stem, in such a way as to form a little canal, with several small openings by which the cavity may be reached. It will not be easy to make out this strange folding of the leaf by an examination of the exterior only, but a longitudinal section, made with a sharp knife or razor, will show it clearly.



COMMON BUTTERWORT.

When minute animals enter the cavity of the leaf through the little openings above mentioned, they are seized by means of small filaments that protrude from the lining cells; and although no special digestive secretion has been discovered in the leaves,

it appears certain that the creatures entrapped are really dissolved, for nothing remains of them after a time except the harder, indigestible portions. Also, there is every reason to believe that the products of digestion are absorbed, probably by the same filaments that are concerned in the capture of the microscopic prey.

Perhaps the most interesting of the carnivorous plants are those which exhibit distinct movements in connexion with the capture of their prey, and among these are the British Butterworts and Sundews, which grow in bogs and other wet places.

There are three British species of Butterwort (*Pinguicula*), similar in structure and habit, all growing in bogs and on wet rocks. They have each a rosette of entire, radical leaves, the lowest of which lie close against the soil or rock on which the plant grows; and violet or yellow flowers on leafless peduncles. The calyx has four or five teeth, arranged in two lips; and the corolla, which is also lipped, has a broad, open throat, and a spur.

The commonest species is the Common Butterwort (*P. vulgaris*), which is found in bogs and wet places, principally in the hilly, humid districts of the West of Britain and Ireland, flowering from May to July. Its leaves are succulent and clammy, of a pale green colour, and covered all over with little glistening spots. The flower stems are three or four inches high, each bearing a single violet flower. In this species the throat of the corolla is bell-shaped, and the spur is as long as the rest of the corolla.

A second species—the Alpine Butterwort (*P. alpina*) —with smaller, pale yellow flowers appearing in June and July, is found only in Scotland; while a third, known as the Pale Butterwort (*P. lusitanica*),

also with pale yellow flowers, and a curved spur, occurs in South-West England as well as in the boggy districts of Ireland and the West of Scotland, flowering from June to October.

The carnivorous habits of all species are the same. The horizontal leaves lie flat on the wet soil, with their margins turned upward forming a kind of shallow trough; and the upper surface of each is dotted with many hundreds of minute glands which secrete a colourless, sticky fluid, thus giving to the leaf its glistening and clammy appearance.

If any mineral or other non-nutritious substance be placed on a leaf, the contact stimulates the little glands, causing them to discharge a larger quantity of fluid, but no change seems to take place in the character or composition of the secretion. But if any nitrogenous organic substance, such as an insect or a small piece of meat, be brought in contact with the glands, not only will the secretion increase in quantity, but it will also assume an acid character, and contain a ferment which is capable of digesting the nitrogenous material. In fact, the secretion produced under these circumstances possesses the same properties as the gastric fluid of the stomachs of animals.

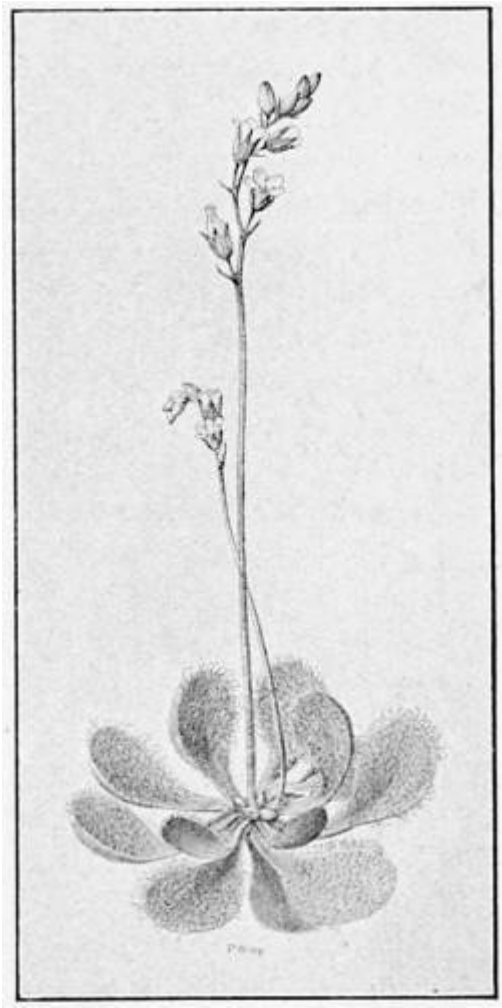
The animal food of the Butterworts consists of small insects and other little creatures. If an insect alights on the leaf, it is caught by the sticky secretion of the glands, and every effort to escape causes it to become more and more besmeared with the mucilage, till, at last, it is no longer able to move; and its death is probably hastened by the stoppage of its spiracles or breathing-holes.

If the insect is a small one, and it settles near the edge of the leaf, the curved margin slowly bends

over it until it is more or less enclosed, and the larger number of glands thus brought in contact with its body pour out their digestive secretion, which slowly dissolves the nourishing portions, leaving nothing but the legs, wings, and other indigestible parts. A larger insect, alighting similarly near the edge of the leaf, could hardly be enclosed by the bending of the margin near it; but it is pushed towards the middle as the edge curls over, and then the opposite side also bends over it, till the insect is more or less enclosed, when it is digested as mentioned above.

The digestion of an insect and the absorption of nutrient matter by the cells of the leaf occupy from twenty to thirty hours, and when the whole is accomplished the leaf slowly expands, assuming its normal position, and exposing the indigestible residue of its prey to be blown away or washed off by the rain.

It has been observed that the Butterworts are not exclusively animal feeders, for their leaves readily digest any pollen cells or the spores of the lower plants that are carried to them by the wind.



THE ROUND-LEAVED SUNDEW.

Equally interesting are the habits of the Sundew (*Drosera*), of which there are three species, all readily distinguished from every other British plant by the glandular hairs that cover the long-stalked, radical leaves. They have leafless flower-stalks, each bearing a one-sided spike or raceme of white flowers. The

sepals, petals, and stamens each number five; and the ovary, which ripens into a one-celled capsule of three or four valves, has three or four forked styles.

The commonest species—the Round-leaved Sundew (*Drosera rotundifolia*)—is abundant and widely distributed, and may be seen among the bog-mosses, sometimes almost completely covering rather large patches of marshland. Its leaves are round, from a quarter of an inch to near half an inch in diameter, spreading in such a manner that they lie close to or near the ground. The flower-stems are slender, erect, from three to six inches long; and the white flowers, which are in a one-sided raceme, bloom during July and August.

The Long-leaved Sundew (*D. longifolia* or *D. intermedia*) has oval leaves, tapering gradually into the stalk. They are more erect than the leaves of the last species, and are not half so broad as they are long. The plant flowers at the same time as the latter, but is not nearly so common.

The third species—the Great English Sundew (*D. anglica*)—is still rarer. Its leaves are still longer and narrower, being sometimes an inch or more in length, and more erect; and the flower-stalk sometimes attains a length of eight inches.

The carnivorous habits of these plants are very similar to those of the Butterworts, but the movements connected with the capture of the prey are more marked in the red filaments which cover the upper surface of the leaves than in the leaves themselves. Those filaments which are situated on the margin of the leaf are longest, and spread outwards, while the others are erect and decrease in length from the edge towards the middle.

Each filament is swollen at its extremity, and supports an enticing globule of glistening fluid which it secretes, for the enlarged extremity is really a minute gland. The fluid, though quite clear, is so viscid that it can be drawn out into threads, and it serves a purpose similar to that of the sticky globules on the spiral thread of a spider's web.

If some grains of sand or other inorganic material be sprinkled on the leaf, the sticky secretion of the glands is appreciably increased, and at the same time assumes an acid character; but it contains no digestive ferment, nor do the filaments change their position to any considerable extent. When, however, a small insect alights on the leaf, attracted by the glistening drops which are probably mistaken for nectar, the secretion not only increases and becomes acid, but a digestive ferment is produced, and the little creature is soon besmeared with the fluid, its condition becoming more and more hopeless through its struggles, till at last further movements are impossible and it dies of suffocation.

A few minutes later the filaments of the leaf immediately around the insect begin to bend towards it, and others a little farther off soon partake in the movement, which may finally extend more or less to all the filaments of the leaf, and thus a large number of glands are brought in contact with the prey. The process of digestion now goes on, and, in a day or two, all the digestible portions of the insect are dissolved and absorbed, and the filaments that were concerned in the work have resumed their original position, leaving the indigestible portions to dry and to be eventually blown away.

The principal food of the Sundews consists of small insects such as ants, midges, flies, small butterflies

and moths, caddis-flies, and even small species of dragon-flies. Some of these, more particularly the long-bodied dragon-flies, the smallest of which are over an inch in length, are much too large to be caught and devoured by a single leaf; and in this case it is not at all uncommon for two or more leaves to be concerned in the capture and digestion of a single insect, each one converging its filaments towards the part of the body within its reach, and each one digesting and absorbing the portion against which it can apply its glands.

Insects, however, do not constitute the sole food of these plants, for small worms, spiders, centipedes, &c., are caught and digested in the manner described; and the plants may also be fed artificially on small pieces of meat or other nitrogenous substances, which give rise to the same processes and movements as we have observed in connection with the natural mode of feeding.

LIST OF FLOWERS

CLASSIFIED ACCORDING TO THEIR HABITATS AND HABITS

The following list of wild flowers, classified according to their habits and principal habitats, will assist the student in his attempts to identify unknown

species. A general acquaintance with the chief distinguishing features of the orders, or, failing this, a frequent reference to these features as given in Chapter I, will be a valuable help; and, the order once determined, the few particulars added to each name will generally narrow the search down to one or two species, leaving the final decision to the more detailed description given in the text.

The first number given after each name is the height, or, in the case of climbing and trailing species, the length of the plant; and this is followed by the colour and diameter, of the flower, or, in the case of the *Dipsaceæ*, *Compositæ*, and some other plants in which the flowers are densely clustered, the diameter of the cluster or head.

Abbreviations are used as follows:—

W. = white
Y. = yellow
G. = green
R. = red
P. = pink
C. = crimson
V. = violet
Bl. = blue
Br. = brown
Pu. = purple
Cr. = cream
Li. = lilac
Ro. = rose
O. = orange
Sc. = scarlet
p. = pale
d. = dark or deep.

A combination of two of the above denotes an

intermediate colour. Thus—G.Y. denotes a greenish yellow; Pu. Br., a purple-brown, &c.

1. Woods and Thickets—Spring (Herbaceous Plants)

	PAGE
Wood Anemone. 4-8 ins. W. 1 in.	48
Green Hellebore. 12-20 ins. G. 1 in.	49
Stinking Hellebore. 1-2 ft. G. ½ in.	49
Goldilocks. 6-10 ins. Y. ⅝ in.	50
Columbine. 1-2 ft. W., Bl. or Pu. 1 in.	50
Dog Violet. 3-6 ins. Bl. or Pu. ⅝ in.	50
Wood Sorrel. 4-6 ins. W. ⅝ in.	52
Wood Strawberry. 2-6 ins. W. ½ in.	53
Sweet Woodruff. 8 ins. W. ¼ in.	54
Lesser Periwinkle. 1-2 ft. Bl. ⅞ in.	54
Toothwort. 5-10 ins. Pu.Br. ⅜ in.	54
Bugle. 3-12 ins. Bl. or Pu. ⅜ in.	55
Yellow Dead Nettle. 10-18 ins. Y. ⅝ in.	55
Primrose. 4-7 ins. p.Y. 1 to 1¼ in.	56
Lady's Slipper. 1 ft. Br. and Y. 2 ins.	58
Broad-leaved Garlic. 6-12 ins. W. ¾ in.	59
Sand Garlic. 2-3 ft. R.Pu. ¼ in.	59
Star of Bethlehem. 6-12 ins. W. 1 in. or more	59
Blue-bell. 6-18 ins. Bl. ½ in.	60
Daffodil. 12-18 ins. Y. 2 ins.	48
Hairy Sedge.	60
Wood Melic Grass	60

2. Spring Flowering Trees and Shrubs.

Barberry. 4-7 ft. p.Y. ⅜ in. 61
Sycamore. 40-50 ft. Y.G. ¼ in. 62
Maple. 15-20 ft. Y.G. ¼ in. 63
Spindle Tree. 4-10 ft. Y.G. ⅜ in. 64
Wild Cherry. 4-8 ft. W. ⅝ in. 64
Bird Cherry. 12-15 ft. W. ½ in. 64
Gean. 12-18 ft. W. ⅝ in. 65
Sloe or Blackthorn. 4-8 ft. W. ½ in. 65
Bullace. 5-8 ft. W. ½ in. 66
Hawthorn. 12-20 ft. W. ½ in. 66
Wild Pear. 20-30 ft. W. 1 in. 66
Crab Apple. 10-20 ft. W. and P. 1½ in. 66
Service Tree. 12-20 ft. W. ⅝ in. 67
White Beam. 10-30 ft. W. ½ in. 68
Mountain Ash. 10-30 ft. Cr.W. 7/16 in. 68
Black Currant. 3-5 ft. Y.G. 5/16 in. 69
Red Currant. 3-5 ft. Y.G. ¼ in. 69
Wayfaring Tree. 10-20 ft. W. 3/16 in. 69
Ash. 40-50 ft. Br. ⅛ in. 69
Spurge Laurel. 2-4 ft. Y.G. ¼ in. 70
Mezereon. 2-4 ft. p.R. 3/16 in. 70
Common Elm. 50-120 ft. Br. Clusters ½ in. 71
Wych Elm. 40-100 ft. Br. Clusters ½ in. 71
Oak. 40-100 ft. G. 72
Beech. 40-100 ft. G. 73
Hornbeam. 20-60 ft. G. 74

Hazel. 8-16 ft. Y.G. 74
Common Birch. 20-50 ft. G. 75
Dwarf Birch. 1-3 ft. G. 75
Alder. 20-50 ft. R.Br. 75
White Poplar. 60-100 ft. Pu.Br. 76
Grey Poplar. 60-100 ft. Pu.Br. 76
Aspen. 30-80 ft. d.Br. 76
Black Poplar. 50-60 ft. Pu.Br. 77
Scots Pine. 50-100 ft. G.Y. 77
Yew. 20-50 ft. G. ⅛ in. 78

NOTE.—The colours given above, in the case of trees bearing catkins, are generally those of the more conspicuous male flowers.

3. Waysides and Waste Ground—Spring.

Celandine. 1-2 ft. Y. ¾ in. 81
Shepherd's Purse. 6-18 ins. W. 1/10 in. 81
Scurvy Grass. 4-8 ins. W. ¼ in. 82
Whitlow Grass. 1-4 ins. W. ⅛ in. 82
Yellow Rocket. 1-2 ft. Y. 5/16 in. 83
Early Winter Cress. 1-2 ft. Y. 3/16 in. 84
Garlic Mustard. 1-2 ft. W. ¼ in. 84
Thale Cress. 6-10 ins. W. ⅛ in. 84
Rape. 1-2 ft. Y. ⅜ in. 85
Wild Turnip. 1-2 ft. Y. ⅜ in. 85
Sweet Violet. 3-6 ins. V., Li. or W. ¾ in. 85
Ciliated Pearlwort. 2-4 ins. W. ⅛ in. 85
Procumbent Pearlwort. 2-3 ins. W. ⅛ in. 85

Greater Stitchwort. 1-2 ft. W. ¾ in. 86
Lesser Stitchwort. 1-3 ft. W. 3/16 in. 87
Chickweed. 3-12 ins. W. 3/16 in. 87
Clustered Mouse-ear Chickweed. 6-10 ins. W. 3/16 in. 88
Narrow-leaved Mouse-ear Chickweed. 6-10 ins. W. ¼ in. 88
Dove's-foot Crane's-bill. 8-12 ins. P. ⅜ in. 89
Jagged-leaved Crane's-bill. 1-2 ft. R. ⅜ in. 89
Herb Robert. 1-2 ft. P. ½ in. 90
Black Medick. ½-2 ft. Y. Heads ¼ in. 90
Grass Vetchling. 1-2 ft. C. ⅜ in. 92
Bird's Foot. 6-18 ins. Cr. and C. Heads ¼ in. 92
Bush Vetch. 2-3 ft. p.Pu. 7/16 in. 92
Barren Strawberry. 2-6 ins. W. ½ in. 93
Moschatel. 4-6 ins. Y.G. Heads ⅜ in. 93
White Bryony. 6-12 ft. G.W. ⅝ in. 94
Common Beaked Parsley. 2-3 ft. W. ⅛ in. 95
Chervil. 3-4 ft. W. ⅛ in. 95
Garden Beaked Parsley. 18 ins. W. 1/10 in. 96
Gout-weed. 1-2 ft. G.W. ⅛ in. 96
Crosswort. 6-18 ins. Y. 1/10 in. 97
Mouse-ear Hawkweed. 2-10 ins. Y. Head 1 in. 98
Groundsel. 6-12 ins. Y. Heads 3/16 in. 98
Colt's-foot. 6 ins. Y. Heads 1 in. 98
Thyme-leaved Speedwell. 3-10 ins. Li. ¼ in. 100

Common Speedwell. 2-10 ins. p.Bl. 1/6 in. 100
Germander Speedwell. 12-18 ins. Bl. ½ in. 100
Wall Speedwell. 4-12 ins. p.Bl. 3/16 in. 101
Grey Field Speedwell. 3-7 ins. Bl. 3/16 in. 101
Green Field Speedwell. 4-8 ins. Bl. 3/16 in. 102
White Dead Nettle. 6-18 ins. W. ⅝ in. 102
Red Dead Nettle. 6-18 ins. Pu. ¼ in. 103
Cut-leaved Dead Nettle. 6-18 ins. Ro. ¼ in. 103
Ground Ivy. 8-20 ins. Bl.Pu. 5/16 in. 104
Early Field Scorpion Grass. 4-10 ins. Bl. 1/16 in. 104
Yellow Pimpernel. 4-10 ins. Y. ½ in. 105
Dog's Mercury. 6-18 ins. G. 3/16 in. 105
Black Bryony. 5-10 ft. Y.G. 3/16 in. 106
Cuckoo Pint. 8-20 ins. 106
Annual Meadow Grass. 107

4. Meadows, Fields and Pastures—Spring.

Lesser Celandine. 3-6 ins. Y. 1 in. 108
Creeping Buttercup. 6-12 ins. Y. ⅞ in. 109
Bulbous Buttercup. 1-2 ft. Y. 1 in. 110
Field Penny Cress. 6-24 ins. W. ⅛ in. 110
Cuckoo Flower. 1-2 ft. W. or Li. ⅝ in. 111
Wild Pansy. 4-10 ins. W.Y. and Pu. ¾ in. 111
Ragged Robin. 1-2 ft. R. or Ro. 1 in. 112
Spotted Medick. 6-24 ins. Y. 3/16 in. 112
Netted Medick. 10-20 ins. Y. 1/16 in. 112

Subterranean Trefoil. 6-18 ins. W.P. or C. ⅛ in. 113
White Clover. 2-20 ins. W. 3/16 in. Heads ⅞ in. 113
Hybrid Trefoil. 3-20 ins. W. or P. 3/16 in. Heads ⅞ in. 113
Purple Clover. 5-20 ins. Pu. ¼ in. Heads 1¼ in. 113
Spring Vetch. 8 ins. Pu. ¼ in. 114
Common Vetch. 1-2 ft. p.Pu. ⅜ in. 115
Meadow Saxifrage. 6-10 ins. W. ⅝ in. 115
Earthnut. 1-3 ft. W. ⅛ in. 116
Daisy. 2-6 ins. W. and Y. Heads ¾ in. 116
Dandelion. 2-8 ins. Y. Head 1½ in. or more 116
Butter-bur. 4-12 ins. P. or Pu. Heads ⅜ in. 117
Yellow Rattle. 6-18 ins. Y. ¼ in. 118
Field Louse-wort. 4-8 ins. Ro. ⅝ in. 118
Henbit Dead Nettle. 5-10 ins. Ro. or Pu. ¼ in. 119
Changing Scorpion Grass. 4-10 ins. Y. or Bl. 1/10 in. 119
Cowslip. 6-12 ins. Y. 7/16 in. 120
Common Sorrel. 1-2 ft. R.Pu. ⅛ in. 120
Sheep's Sorrel. 3-12 ins. R.Pu. ⅛ in. 121
Twayblade. 1-2 ft. Y.G. 7/16 in. 121
Green-winged Orchis. 6-12 ins. G. and Pu. ½ in. 122
Early Purple Orchis. 6-18 ins. Pu.P. or W., ⅝ in. 122
Fox-tail Grass. 122

5. Bogs, Marshes and Wet Places—Spring.

Marsh Marigold. 9-18 ins. Y. 1¼ in. 123
Marsh Violet. 2-6 ins. Li. ⅝ in. 123
Sundew. 2-6 ins. W. 3/16 in. 355
Marsh Stitchwort. 6-18 ins. W. ½ in. 124
Bog Stitchwort. 4-12 ins. W. 3/16 in. 124
Marsh Cinquefoil. 6-18 ins. Pu.Br. ⅞ in. 124
Common Golden Saxifrage 2-5 ins. Y. ⅛ in. 125
Alternate-leaved Golden Saxifrage. 2-5 ins. Y. ⅛ in. 125
Marsh Pennywort. Creeping. W. 1/16 in. 126
Marsh Valerian. 6-8 ins. p.Ro. ⅛ in. 126
Marsh Trefoil. 6-12 ins. P.W. ¾ in. 127
Red Rattle. 6-18 ins. C. ⅝ in. 127
Willows. 128
Yellow Flag. 2-4 ft. Y. 3 ins. 129

6. Woods, Thickets and Copses—Summer.

Lime Tree. 20-50 ft. Y.G. ⅜ in. 130
Tutsan. 1-3 ft. Y. ¾ in. 132
Rose of Sharon. 10-18 ins. Y. 3 ins. 132
Common St. John's Wort. 1-2 ft. Y. ¾ in. 132
Hairy St John's Wort. 1-3 ft. Y. ¾ in. 133
Wood Crane's-bill. 1-2 ft. Bl.Pu. 1 in. 133
Dyer's Green-weed. 1-2 ft. Y. ⅝ in. 134
Sweet Milk Vetch. 2-3 ft. p.Y. or Cr. ¼ in. 135
Tuberous Bitter Vetch. 6-12 ins. R.Pu. ⅜ in. 135

Narrow-leaved Everlasting Pea. 2-6 ft. p.Pu. ¾ in. 136
Wild Raspberry. 3-5 ft. W. 7/16 in. 136
Rose Bay Willow herb. 2-6 ft. Ro. 1 in. 137
Pale Smooth-leaved Willow-herb. 1-2 ft. Ro. ⅜ in. 137
Enchanter's Nightshade. 1-2 ft. W. ¼ in. 138
Dogwood. 5-8 ft. Y.W. ½ in. (Shrub) 138
Wood Sanicle. 1-2 ft. P.W. 1/16 in. 139
Angelica. 2-4 ft. W. ⅛ in. 139
Elder Tree. 12-20 ft. W. or Cr. ¼ in. 140
Guelder Rose. 6-9 ft. W. 3/16 to ⅝ in. (Shrub). 141
Great Valerian. 2-4 ft. P.W. 3/16 in. 142
Succory-leaved Hawk's-beard 1-3 ft. Y. Head ⅞ in. 142
Saw-wort. 1-3 ft. Pu. or C. Heads 5/16 in. 142
Golden Rod. 6-24 ins. Y. Heads 7/16 in. 142
Great Leopard's-bane. 2-3 ft. Y. 1½ ins. 143
Plantain-leaved Leopard's-bane. 2-3 ft. Y. 2 ins. 143
Giant Bell-flower. 3-5 ft. Bl. 1¼ ins. 144
Creeping Bell-flower. 1-2 ft. Bl. 1 in. 144
Nettle-leaved Bell-flower. 1-3 ft. Bl. 1 in. 144
Ivy-leaved Bell-flower. Creeping. p.Bl. 5/16 in. 144
Holly Tree. 10-30 ft. W. 5/16 in. 145
Privet (shrub). 4-12 ft. W. 5/16 in. 145
Common Cow-wheat. 6-18 ins. p.Y. ¼ in. 146

Crested Cow-wheat. 6-20 ins. Y. and Pu. 3/16 in. 147
Wood Cow-wheat. 6-20 ins. d. Y. ⅛-3/16 in. 147
Foxglove. 2-6 ft. Pu. or W. ⅞ in. 148
Wood Betony. 1-2 ft. Pu., C., P. or W. ⅜ in. 149
Wood Forget-me-not. 1-2 ft. Bl. ⅜ in. 150
Millet Grass. 150
Bearded Wheat. 150
Slender False Brome Grass. 150

7. Waysides and Waste Ground—Summer.

Wild Clematis. 4-10 ft. W. ¾ in. 151
Hedge Mustard. 1-2 ft. Y. 1/10 in. 152
Felix Weed. 1-2 ft. G.Y. 1/16 in. 152
Dyer's Weed. 2-3 ft. Y. 3/16 in. 153
Deptford Pink. 12-18 ins. Ro. ½ in. 153
Red Campion. 1-2 ft. R. ⅞ in. 153
Common Mallow. 2-3 ft. Li. 1¼ in. 155
Dwarf Mallow. 6-24 ins. Li. ⅝ in. 155
Musk Mallow. 2-3 ft. Ro. or W. 1½ in. 156
Round-leaved Crane's-bill. 6-12 ins. P. ⅜ in. 158
Bloody Crane's-bill. 1-2 ft. C. 1 in. 158
Small-flowered Crane's-bill. 6-18 ins. Li. 1/3 in. 158
Hemlock Stork's-bill. 6-18 ins. Ro. or W. ½ in. 160
Bird's-foot Trefoil. 6-15 ins. Y. or O. ½ in. 160
Hairy Tare. 1-2 ft. p.Bl. ⅛ in. 161

Slender Tare. 1-2 ft. Bl. ⅛ in. 161
Tufted Vetch. 3-6 ft. Bl.Pu. ¼ in. 162
Herb Bennet. 1-2 ft. Y. ⅝ in. 164
Dog Rose. 4-8 ft. P. or W. 2 ins. 164
Silver Weed. 6-12 ins. Y. ⅞ in. 165
Hoary Cinquefoil. 6-18 ins. Y. ½ in. 166
Creeping Cinquefoil. 6-18 ins. Y. ¾ in. 166
Agrimony. 1-2 ft. Y. ⅜ in. 166
Broad Smooth-leaved Willow-herb. 1-2 ft. p.Pu. ⅜ in. 166
Orpine. 10-20 ins. R.Pu. ⅜ in. 166
Hemlock. 2-6 ft. W. 1/16 in. 169
Fool's Parsley. 12-18 ins. W. 1/16 in. 170
Wild Parsnip. 2-3 ft. Y. 1/10 in. 170
Cow Parsnip. 4-5 ft. R.W. Outer flowers ⅜ in. 170
Upright Hedge Parsley. 2-3 ft. W. or P. ⅛ in. 171
Rough Chervil. 1-3 ft. W. ⅛ in. 171
Honeysuckle. 10-12 ft. Y. and R. 1 in. 172
Upright Honeysuckle. 3-6 ft. p.Y. ¼ in. 172
Perfoliate Honeysuckle. 10-12 ft. R.W. 1¼ in. 172
Great Hedge Bedstraw. 2-5 ft. W. 3/16 in. 172
Goose Grass. 2-5 ft. W. 1/10 in. 173
Teasel. 3-6 ft. p.Pu. Heads 2 ins. 173

8. Waysides and Waste Ground—Summer. (Composite Flowers Only.)

Yellow Goat's-beard. 1-2 ft. Y. Heads 1¼ in. 177
Bristly Ox-tongue. 2-3 ft. Y. Heads ⅞ in. 177
Hawkweed Picris. 2-3 ft. Y. Heads 1 in. 178
Strong-scented Lettuce. 3-4 ft. p.Y. Heads ⅜ in. 178
Prickly Lettuce. 3-4 ft. Y. Heads ¼ in. 179
Sharp-fringed Sow Thistle. 2-3 ft. Y. Heads ¾ in. 179
Common Sow Thistle. 2-3 ft. Y. Heads ¾ in. 180
Smooth Hawk's-beard. ½-3 ft. Y. Heads ½ in. 180
Shrubby Hawkweed. 2-4 ft. Y. Heads ¾ in. 181
Nipplewort. 1-2 ft. Y. Heads ⅜ in. 181
Chicory. 1-3 ft. Bl. Heads 1½ in. 182
Burdock. 2-6 ft. Pu. Heads ¾ in. 182
Welted Thistle. 1-3 ft. Pu. Heads ¾ in. 183
Spear Thistle. 1-5 ft. Pu. Heads 1¼ in. 183
Creeping Thistle. 2-4 ft. Pu. Heads ¾ in. 184
Tansy. 3 ft. Y. Heads ½ in. 185
Mugwort. 2-4 ft. Br.Y. Heads ⅛ in. 185
Wormwood. 1-2 ft. Y. Heads 3/16 in. 186
Common Ragwort. 1-4 ft. Y. Heads ⅞ in. 187
Feverfew. 1-2 ft. Y. and W. Heads ⅝ in. 187
Scentless Mayweed. 1-2 ft. Y. and W. Heads 1¼-2 in. 188
Milfoil. 6-18 ins. W. Heads 5/16 in. 189

9. Waysides and Waste Ground—Summer (*continued*).

Rampion Bellflower. 2-3 ft. Bl. ⅝ in. 190
Great Bindweed. 4-6 ft. W. 2 ins. 190
Great Dodder. Parasitic. P. Heads ½ in. 341
Lesser Dodder. Parasitic. P. Heads ¼ in. 341
Flax Dodder. Parasitic. P. Heads ½ in. 341
Clover Dodder. Parasitic. P. Heads ¼ in. 341
Henbane. 1-2 ft. Y. ⅞ in. 191
Black Nightshade. ½-2 ft. W. 7/16 in. 192
Woody Nightshade. 3-6 ft. Pu. 7/16 in. 192
Deadly Nightshade. 2-3 ft. Pu. ⅝ in. 194
Red Bartsia. 6-18 ins. R. ¼ in. 195
Yellow Toadflax. 1-3 ft. Y. ⅜ in. 195
Vervein. 1-2 ft. Li. ⅛ in. 196
Common Calamint. 1-2 ft. Pu. 1/3 in. 198
Lesser Calamint. 1-2 ft. Pu. ¼ in. 198
Balm. 1-3 ft. W. ⅜ in. 198
Black Horehound. 2-3 ft. Pu. 1/3 in. 199
Hedge Woundwort. 1-3 ft. R.Pu. 1/3 in. 199
Field Scorpion Grass. 6-18 ins. Bl. 3/16 in. 200
Gromwell. 12-18 ins. P.Y. 3/16 in. 200
Borage. 1-2 ft. B. ⅞ in. 200
Common Alkanet. 1-2 ft. B. 7/16 in. 201
Evergreen Alkanet. 1-2 ft. B. ⅜ in. 201
Hound's-tongue. 1-2 ft. R.Pu. ⅜ in. 201

Buck's-horn Plantain. 2-9 ins. G. Spike 1-2 ins. 202
Stinking Goose-foot. 6-15 ins. G. 1/16 in. 203
Many-seeded Goose-foot. 8-20 ins. G. 1/16 in. 203
Upright Goose-foot. 1-3 ft. G. 1/10 in. 203
White Goose-foot. 1-3 ft. G. 1/10 in. 204
Fig-leaved Goose-foot. 1-2 ft. G. 1/16 in. 204
Red Goose-foot. 1-3 ft. G. 1/16 in. 204
Mercury Goose-foot. 1-3 ft. G. 1/10 in. 204
Orache. ½-3 ft. G. 1/16 in. 204
Spotted Persicaria. 1-2 ft. G.Ro. ⅛ in. 205
Pale Persicaria. 2-4 ft. G.P. ⅛ in. 206
Knot-grass. 2-3 ft. Variable ⅛ in. 206
Broad-leaved Dock. 2-3 ft. R.G. ⅛ in. 206
Curled Dock. 2-3 ft. R.G. ⅛ in. 207
Sun Spurge. 6-18 ins. G.Y. ¼ in. 208
Petty Spurge. 6-12 ins. Y. 1/6 in. 208
Small Nettle. 1-2 ft. G. 1/10 in. 209
Great Nettle. 1-4 ft. G. 1/10 in. 209
Roman Nettle. 1-2 ft. G. 1/5 in. 209
Hop. 12-20 ft. G.Y. Male racemes 3½ ins. long. Female heads ⅝ in. 210
Canary Grass. 210

10. Meadows, Fields and Pastures—Summer.

Upright Buttercup. ½-3 ft. Y. ⅞ in. 211
Pale Hairy Crowfoot. ½-1 ft. p.Y. ¾ in. 212
Gold of Pleasure. 1-3 ft. Y. ⅛ in. 212

Bladder Campion. 2-3 ft. W. ⅝ in. 213
White Campion. 1-2 ft. W. 1 in. 213
Kidney Vetch. 6-12 ins. Y. or O. ¼ in. 214
Lucerne. 1-2 ft. Pu. or Bl. ¼ in. 215
Common Melilot. 2-4 ft. Y. ⅛ in. 215
Field Melilot. 1-2 ft. Y. 1/16 in. 216
White Melilot. 2-3 ft. W. ⅛ in. 216
Clustered Clover. 6-12 ins. Pu. or P. ⅛ in. 216
Strawberry Trefoil. 6-12 ins. Ro. 1/16 in. Heads ¼ in. or more. 216
Hare's-foot Trefoil. 6-12 ins. 1/16 in. Heads ⅜ in. 217
Crimson Clover. 6-16 ins. C. or P. ¼ in. Heads 1 in. or more. 217
Hop Trefoil. 6-20 ins. Y. 1/16 in. Heads ¼ in. 217
Lesser Yellow Trefoil. 6-18 ins. p.Y. 1/10 in. Heads ¼ in. 218
Meadow Vetchling. 1-2 ft. Y. ½ in. 218
Great Burnet. 1-2 ft. Pu. ⅛ in. Heads ⅝ in. 218
Lady's Mantle. 6-18 ins. Y.G. 3/16 in. 218
Meadow Sweet. 2-4 ft. Cr. W. ¼ in. 218
Burnet Saxifrage. 1-2 ft. W. 1/16 in. 219
Wild Carrot. 1-2 ft. p.Pu. or W. ⅛ in. 220
Devil's-bit Scabious. 1-2 ft. Bl.Pu. Heads ¾ in. 220
Rough Hawkbit. 4-12 ins. Y. Heads 1¼ in. 222
Autumnal Hawkbit. 6-18 ins. Y. Heads 1 in. 223

Meadow Thistle. 12-18 ins. Pu. Heads 1⅛ in. 224
Black Knapweed. ½-3 ft. Pu. Heads 1¼ in. 224
Great Knapweed. 2-3 ft. Pu. or W. Heads 2 ins. 225
Common Fleabane. ½-2 ft. Y. Heads ¾ in. 225
Small Fleabane. 6-12 ins. Y. Heads ⅜ in. 226
Ox-eye Daisy. 1-2 ft. Y. and W. 1¾ in. 227
Sneeze-wort. 1-2 ft. W. ½ in. 227
Centaury. 6-18 ins. Ro. or P. ⅜ in. 227
Small Bindweed. ½-2 ft. P. 1 in. 228
Meadow Clary. 1-2 ft. Bl. ⅝ in. 229
Marjoram. 9-18 ins. Ro. Pu. 3/16 in. 231
Self-heal. 4-10 ins. V. or Pu. ¼ in. 232
Greater Plantain. 2-9 ins. G. ⅛ in. Spike 5-8 ins. 232
Ribwort Plantain. 2-10 ins. G. ⅛ in. Spike 1 in. 233
Marsh Orchis. 1-2 ft. W. to Pu. ⅝ in. 233
Butterfly Orchis. 6-14 ins. W. or G.W. ½¾ in. 234
Cat's-tail Grass. 233
Meadow Barley. 233
Sheep's Fescue Grass. 234
Rye Grass or Darnel. 234
Cock's-foot Grass. Plate IV

11. Bogs, Marshes, and Wet Places—Summer.

Lesser Spearwort. 4-12 ins. Y. ½ in. 236
Greater Spearwort. 2-4 ft. Y. 1 to 1½ ins. 236
Water Cress. 1-3 ft. W. ¼ in. 236
Marsh Yellow Cress. 1-2 ft. Y. ⅛ in. 237
Amphibious Yellow Cress. 2-3 ft. Y. ¼ in. 237
Marsh Mallow. 2-3 ft. Ro. 1⅜ in. 238
Marsh St. John's Wort. 6-12 ins. Y. ½ in. 238
Marsh Pea. 2-3 ft. Bl.Pu. ½ in. 239
Great Hairy Willow-herb. 3-6 ft. d.Ro. ⅞ in. 239
Marsh Willow-herb. 6-18 ins. P. 5/16 in. 240
Square-stalked Willow-herb. 1-2 ft. Ro. ⅜ in. 240
Purple Loosestrife. 2-4 ft. P. or Pu. ¾ in. 240
Procumbent Marsh-wort. 2-3 ft. W. 1/16 in. 240
Water Hemlock. 3-4 ft. W. 1/16 in. 241
Common Water Dropwort. 2-3 ft. W. 3/16 in. 242
Hemlock Water Dropwort. 2-5 ft. W. 3/16 in. 242
Fine-leaved Water Dropwort. 1-4 ft. W. ⅛ in. 243
Marsh Thistle. 2-8 ft. Pu. or W. Heads ⅝ in. 243
Nodding Bur Marigold. 1-2 ft. G.Y. Heads ¾ in. 244
Trifid Bur Marigold. 1-2 ft. G.Y. Heads ½ in. 244
Marsh Ragwort. 1-3 ft. Y. Heads 1 in. 244
Marsh Speedwell. 4-8 ins. p.P. or W. 5/16 in. 244

Water Speedwell. ½-2 ft. Li. or W. 3/16 in. 245
Brooklime. 1-2 ft. Bl. or P. 1/3 in. 245
Water Figwort. 2-4 ft. G.Br. or Pu. ¼ in. 246
Knotted Figwort. 1-3 ft. G.Br. or Pu. 3/16 in. 246
Gipsy-wort. 1-3 ft. W. ⅛ in. 246
Round-leaved Mint. 1-3 ft. Li. 1/10 in. 247
Water Mint. 1-3 ft. Li. ⅛ in. 247
Marsh Whorled Mint. 2-5 ft. Li. ⅛ in. 248
Marsh Woundwort. 1-3 ft. p.Pu. or R. ⅜ in. 248
Forget-me-not. 12-18 ins. Bl. ⅜ in. 249
Creeping Water Scorpion-grass. 4-12 ins. Bl. 5/16 in. 249
Tufted Water Scorpion-grass. 5-18 ins. Bl. 3/16 in. 249
Bog Pimpernel. 3-4 ins. P. ⅜ in. 250
Water Pepper. 1-3 ft. P.G. ⅛ in. 250
Marsh Helleborine. 6-18 ins. W. ⅝ in. 250
Bog Asphodel. 6-10 ins. Y. ½ in. 251
Common Rush. 1-3 ft. Br. ⅛ in. 252
Hard Rush. 1-2 ft. Glossy Br. ⅛ in. 252
Shining-fruited Jointed Rush. 1-2 ft. Br. ⅛ in. 253
Toad Rush. 2-8 ins. Br. 1/10 in. 253
Common Cotton Grass. 254
Hare's-tail Cotton Grass. 255
Common Sedge. 256
Marsh Sedge. 256

12. Heath, Down and Moor—Spring and Summer.

Milkwort. 2-9 ins. W. Li. or Bl. 3/16 in. 259
Trailing St. John's-wort. 3-10 ins. Y. ⅜ in. 260
Small St. John's wort. 12-20 ins. Y. ½ in. 260
Broom. 2-6 ft. Y. ⅞ in. (Shrub) 260
Furze. 2-5 ft. Y. ⅝ in. (Shrub) 260
Dwarf Furze. 1-2 ft. Y. ½ in. (Shrub) 261
Needle Whin. ½-2 ft. Y. ⅜ in. (Shrub) 262
Common Rest Harrow. 1-2 ft. Ro. ⅝ in. 262
Spiny Rest Harrow. 6-12 ins. Ro. ⅝ in. 262
Dropwort. 12-18 ins. W. ⅜ in. 262
Tormentil. 6-10 ins. Y. 5/16 in. 262
Blackberry. 2-10 ft. W. or P. 1 in. 263
Yellow Bedstraw. ½-2 ft. Y. or G. ⅛ in. 263
Smooth Heath Bedstraw. 4-6 ins. W. ⅛ in. 263
Upright Bedstraw. 1-2 ft. W. ⅛ in. 264
Small Woodruff. 6-10 ins. W. or P. 3/16 in. 264
Small Scabious. 1-2 ft. p.Pu. or Li. Heads 1⅛ ins. 265
Hairy Hawkbit. 3-8 ins. Y. Heads ¾ in. 266
Musk Thistle. 1-3 ft. Pu. or C. Heads 1¾ ins. 266
Dwarf Thistle. 1-8 ins. Pu. Heads 1½ ins. 266
Carline Thistle. 6-18 ins. Y. and Pu. Heads 1¼ in. 267
Chamomile. 6-12 ins. Y. and W. Heads ⅞ in. 268

Harebell. 6-20 ins. Bl. ¾ in. 269
Clustered Bell-flower. 3-18 ins. Bl. ⅝ in. 269
Sheep's-bit. 6-12 ins. Bl. or Li. Heads ⅝ in. 270
Cross-leaved Heath. 12-18 ins. Ro. or W. ⅛ in. 270
Ciliated Heath. 12-18 ins. Ro. or C. ⅛ in. 271
Bell Heather. 1-2 ft. Pu., Ro. or W. ⅛ in. 271
Ling. 1-2 ft. Ro., Li. or W. ⅛ in. 271
Whortleberry. 6-18 ins. P. or G. 3/16 in. 272
Great Bilberry. 6-10 ins. p.P. ⅛ in. 272
Red Whortleberry. 6-18 ins. p.P. 3/16 in. 272
Marsh Gentian. 6-10 ins. d.B. ⅞ in. 273
Small-flowered Gentian. 3-12 ins. p.Pu. ⅜ in. 273
Lesser Dodder. Parasitic on Heaths, &c. 341
Eyebright. 1-8 ins. P. or Li. ⅜ in. 274
Pennyroyal. 2-10 ins. Li. ⅛ in. 274
Wild Thyme. 2-8 ins. Pu. 3/16 in. 274
Wood Sage. 1-2 ft. G.W. 5/16 in. 274
Lesser Skull-cap. 3-6 ins. p.P. 3/16 in. 275
Dwarf Willow. 1-3 ft. (Shrub) 276
Juniper. 1-5 ft. (Shrub) 276
Autumnal Lady's Tresses. 4-8 ins. W. 3/16 in. 277
Spotted Orchis. 6-15 ins. Pu., Li. or W. ½ in. 277
Butcher's Broom. (Shrub). 3-4 ft. W. 1/6 in. 278
Heath Rush. 4-10 ins. 279
Field Woodrush. 4-7 ins. 279

Quaking Grass. 280
Mat Grass. 280

13. Corn Fields.

Pheasant's-eye. 6-12 ins. C. 5/16 in. 281
Mouse-tail. 2-6 ins. Y.G. 5/16 in. 281
Corn Crowfoot. 6-18 ins. p.Y. ⅜ in. 282
Field Larkspur. 9-18 ins. Bl., P., or W., 1 in. 282
Common Red Poppy. 1-2 ft. Sc. 2-3 ins. 283
Long-headed Poppy. 1-2 ft. Sc. 2 to 2½ ins. 283
Long Prickly-headed Poppy. 6-10 ins. R. 1¼ to 1½ ins. 283
Opium Poppy. 1-2 ft. W. or Bl. 2¼ to 2½ ins. 284
Fumitory. 6-24 ins. P. or C. 1/16-3/16 in. 285
Wild Mustard. 1-2 ft. Y. ½ in. 286
White Mustard. 1-2 ft. Y. ⅜ in. 286
Black Mustard. 1-3 ft. Y. ⅜ to ½ in. 287
Wild Radish. 1-2 ft. W. Li., or p.Y., ¾ in. 288
Corn Cockle. 1-3 ft. p.Pu., 1 in. or more. 289
Corn Spurrey. 6-18 ins. W. ¼ in. 289
Common Flax. 12-18 ins. Bl. ⅞ in. 289
Shepherd's Needle. 3-12 ins. W. 1/16 in. 289
Field Madder. 5-10 ins. Li., ⅛ in. 290
Field Scabious. 1-4 ft. Li., Heads 1½ in. 290
Corn Sow-thistle. 2-4 ft. Y. Heads 1¾ ins. 291
Corn Blue-bottle. 1-2 ft. Bl. Heads 1 in. 291
Corn Marigold. 12-18 ins. Y. Heads 1¼ in. 292

Corn Chamomile. 1-2 ft. Y. and W. Heads 1 in. 292
Stinking Chamomile. 9-15 ins. Y. and W. Heads 1 in. 293
Corn Bellflower. 6-10 ins. Pu.Bl. or W. 5/16 in. 293
Small Bugloss. ½-2 ft. p.Bl. ¼ in. 294
Scarlet Pimpernel. 5-20 ins. Sc. ⅜ in. 294
Climbing Persicaria. 1-4 ft. p.G. 3/16 in. 295
Dwarf Spurge. 2-10 ins Y. ⅛ in. 295
Wild Oat Grass. 2-3 ft. 295

14. On the Chalk.

Pasque Flower. 5-8 ins. Pu. 1¼ to 1½ in. 297
Round Prickly-headed Poppy. 12-18 ins. C. 1-2 ins. 297
Bitter Candytuft. 6-9 ins. W., Li., or R., ¼ in. 298
Wild Mignonette. 1-2 ft. Y. 3/16 in. 298
Rock Rose. 3-9 ins. Y. ¾-1 in. 298
Hoary Rock Rose. 5-8 ins. Y. ⅜ in. 298
Hairy Violet. 3-6 ins. p.Bl., or W. ⅝ in. 298
Perennial Flax. 1-2 ft. Bl. 1 in. 299
Narrow-leaved Flax. 1-2 ft. Li. or Bl. ⅜ in. 299
Sain-foin. 1-2 ft. Ro.R. ½ in. 299
Tufted Horse-shoe Vetch. 5-20 ins. Y. 5/16 in. 299
Sweet Briar. 3-6 ft. Ro. 1¼ to 1½ in. 300
Lesser Burnet. 6-18 ins. Pu. ⅛ in. Heads ½ in. 302

Rough-fruited Corn Bedstraw. 1-3 ft. W. ⅛ in. 302
Red Spur Valerian. 1-3 ft. Ro.R. 3/16 in. 302
Woolly-headed Plume Thistle. 3-5 ft. p.Pu. Heads 2½ ins. 303
Ploughman's Spikenard. 2-5 ft. Y. Heads ⅜ in. 303
Field Gentian. 4-10 ins. Bl. Pu. 7/16 in. 304
Yellow-wort. 6-20 ins. Y. ⅝ in. 304
Great Mullein. 2-5 ft. p.Y. or W. ¾ in. 304
White Mullein. 2-3 ft. W. or Cr. ⅜ in. 305
Yellow Hoary Mullein. 2-3 ft. Y. ⅝ in. 305
Dark Mullein. 2-3 ft. Y. ½ in. 305
Spiked Speedwell. 6-12 ins. Bl., or P. 5/16 in. 305
Wild Sage. 1-2 ft. Bl.Pu. 3/16 in. 306
Red Hemp Nettle. 9-12 ins. Ro. 5/16 in. 306
Viper's Bugloss. 1-3 ft. Ro. or Bl.Pu. ½ in. 306
Purple Viper's Bugloss. 1-3 ft. Bl. ⅜ in. 307
Lamb's-tongue. 3-12 ins. G. ⅛ in. Spikes 2-4 ins. 307
Broad-leaved Helleborine. 1-3 ft. G. and Pu. ¼ in. 308
Large White Helleborine. 6-20 ins. Cr.W. ¾ in. 308
Pyramidal Orchis. 6-18 ins. Ro., or W. 5/16 in. 308
Sweet-scented Orchis. 12-18 ins. Ro. ⅜ in. 309
Green Man Orchis. 6-12 ins. G.Y. ⅝ in. 309
Green Musk Orchis. 5-6 ins. G. ½ in. 309

Bee Orchis. 6-12 ins. Pu., Br., and P. ⅝ in. 310
Late Spider Orchis. 6-12 ins. Pu. ⅝ in. 310
Spider Orchis. 6-10 ins. Pu.Br. ¾ in. 310
Fly Orchis. 6-12 ins. Br.Pu., and Bl. ⅝ in. 310
Downy Oat Grass. 1-2 ft. 311
Yellow Oat Grass. 1-2 ft. 311

15. On River Banks.

Common Meadow Rue. 1-4 ft. p.Y. ½ in. 312
Meadow Crane's-bill. 1-4 ft. Bl.Pu. 1 to 1¼ in. 312
Hemp Agrimony. 2-6 ft. Li. Flowers ⅛ in. in small heads. 313
Common Skull-cap. 8-16 ins. Bl. ¼ in. 313
Comfrey. 2-3 ft. Y.W., or Pu. ⅜ in. 315
Yellow Loosestrife. 2-3 ft. Y. ⅝ in. 315
Purple Loosestrife. 2-4 ft. P. or Pu. ¾ in. 240
Great Water Dock. 3-6 ft. R.G. ⅛ in. 317
Willows and Sallows. 317

16. On Walls, Roofs, and Rocks.

Wallflower. 6-12 ins. Y. or O. ⅞ in. 320
Wall Rocket. 1-3 ft. p.Y. ⅝ in. 320
Vernal Sandwort. 2-4 ins. W. ⅜ in. 320
Shining Crane's-bill. 6-18 ins. Ro. ¼ in. 320
English Stonecrop. 2-3 ins. W. or P. 5/16 in. 321
White Stonecrop. 3-7 ins. W. or P. ¼ in. 322
Biting Stonecrop. 2-4 ins. Y. ½ in. 322
House Leek. 9-18 ins. Pu. or P. ¾ in. 323

Wall Pennywort. 6-18 ins. Y.G. 3/16 in. 323
London Pride. 6-12 ins. W., or P. ¼ in. 324
Starry Saxifrage. 3-7 ins. W. 7/16 in. 325
Yellow Mountain Saxifrage. 5-6 ins. Y. ⅝ in. 325
Rue-leaved Saxifrage. 3-5 ins. W. ⅛ in. 325
Mossy Saxifrage. 3-10 ins. W. ⅝ in. 326
Snapdragon. 1-2 ft. W. to C. ¾ in. 326
Ivy-leaved Toadflax. 3-20 ins. Li. 3/16 in. 327
Wall Pellitory. 6-24 ins. G. 1/16 in. 327

17. Autumn Flowers.

(Most of the following flowers bloom during the summer, and have been included in foregoing lists; but these, together with the few new species named, may be seen in flower during the autumn months.)

Pheasant's-eye. 6-12 ins. C. 5/16 in. (Fields) 281
Hairy Crowfoot. 6-12 ins. Y. ¾ in. (Fields) 212
Shepherd's Purse. 6-18 ins. W. 1/10 in. (Waysides) 81
Rock Rose. 3-9 ins. Y. ⅞ in. (Banks) 298
Chickweed. 3-12 ins. W. 3/16 in. (Waysides) 87
Herb Robert. 1-2 ft. P. ½ in. (Waysides) 90
Silver Weed. 6-12 ins. Y. ⅞ in. (Waysides) 165
Ivy. Climbing. p.G. ⅜ in. (Walls and Woods) 339
Yellow Bedstraw. ½-2 ft. Y. or G. ⅛ in. (Downs) 263
Small Scabious. 1-2 ft. Li. Heads 1⅛ in. (Heaths) 265

Devil's-bit Scabious. 1-2 ft. Pu.Bl. Heads ¾ in. (Pastures) 220
Field Scabious. 1-4 ft. Li. Heads 1½ ins. (Fields) 290
Dandelion. 2-8 ins. Y. Heads 1¾ in. (Meadows, &c.) 116
Carline Thistle. 6-18 ins. Y. and Pu. Heads 1¼ in. (Downs) 267
Black Knapweed. ½-3 ft. Pu. Heads 1¼ in. (Meadows) 224
Great Knapweed. 2-3 ft. Pu., or W. Heads 2 in. (Fields) 225
Groundsel. 6-12 ins. Y. Heads 3/16 in. (Waysides) 98
Fleabane. 6-24 ins. Y. Heads ⅞ in. (Moist places) 225
Daisy. 2-6 ins. Y. and W. Heads ¾ in. (Pastures) 116
Scentless Mayweed. 1-2 ft. Y., and W. Heads 1¼-2 ins. (Waysides) 188
Chamomile. 6-12 ins. Y. and W. Heads ⅞ in. (Waysides) 268
Milfoil. 8-18 ins. W. Heads 5/16 in. (Waysides) 189
Ling. 1-2 ft. Ro. or W. ⅛ in. (Moors) 271
Fine-leaved Heath. 1-2 ft. P. or W. ⅛ in. (Moors) 271
Strawberry Tree. 8-12 ft. Cr. 3/16 in. (Woods—Ireland) 338
Dark Mullein. 2-3 ft. Y. ½ in. (On chalk) 305

Yellow Toadflax. 1-3 ft. Y. ⅜ in. (Waysides, fields) 195
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Axillary. Situated in an axil 6

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Labiate. Lipped. Applied to the calyx or the corolla of a flower when it is divided into two lips.

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Whorl. A term applied to organs or parts arranged around a common centre 5

THE END

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Transcriber's Note:

Inconsistent hyphenation in the original has been retained in this version.

P. 24 "net veneid" changed to "net veined"

P. 40 "Lombardy Polar" changed to Lombardy Poplar

P. 75 "which peals off" changed to peels off

P. 78 "and peals off" changed to peels

P. 81 "of a glaucus green" changed to glaucous

P. 93 "Wild Strawbery" changed to Strawberry

P. 94 "Caprifoliacæ" changed to Caprifoliaceæ

P. 118 "stems each bears a" changed to bear

P. 119 "It leaves are" changed to Its

P. 124 "Glancous" changed to Glaucous

P. 207 "is usually nubranched" changed to unbranched

P. 228 "Convolvulacæ" changed to Convolvulaceæ

P. 265 "which is somewhat resembles" changed to it

P. 272 "Vacciniam" changed to Vaccinium

P. 272 "Crowberry" changed to Cowberry

P. 304 "Great Mullien" changed to Mullein

P. 367 et seq. Section numbers corrected - 11 was omitted in original

P. 368 Added 253 to entry "Toad Rush"

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